Operational Requirements Document
For

Land Warrior

ACAT I

Prepared for MS III Decision

31 October 2001

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1.0 General Description of Operational Capability.

1.1 Mission Need**.** A need exists to integrate multiple soldier components and rapidly leverage emerging technology to enable increased small unit lethality, command and control, mobility, survivability, and sustainment. The evolution of the soldier as a system concept originated from the Mission Needs Statement for The Enhanced Integrated Soldier System – Dismounted (TEISS-D), approved 8 September 1993. The soldier as a system concept that provides an integrated system's approach to increasing soldier and small unit capability is the Land Warrior (LW) Program.

1.2 Overall Mission Area. The core mission of task organized infantry soldiers equipped with the LW System regardless of employment (light force, Interim Brigade Combat Team (IBCT), Airborne, etc) is to close with the enemy by means of fires and maneuver to destroy or capture him, or repel his assault by fire, close combat, and counterattack. The enhanced capability of the LW system will better enable mission performance of the following Army Universal Task List Tactical Actions, Missions and Operations. LW equipped soldiers will support Army Tactical Mission (ATM) 1.0-Conduct Offensive Actions, Army Tactical Mission 2.0-Conduct Defensive Missions, Army Tactical Mission 3.0-Conduct Stability Actions, and more specifically, Army Tactical Mission 5.0-Conduct Tactical Mission Tasks. Although no requirements are specifically derived from Army Tactical Mission 4.0-Conduct Support Operations, the enhanced command and control (C2) capability would enable small unit efficiency and local situational awareness.

1.3 Capstone Requirements Document (CRD). Not applicable.

1.4 Proposed System Description. The LW System will enhance Infantry small unit effectiveness through the development and integration of an assortment of systems, components and technologies into a cohesive and combat effective system. In the context of overall soldier load management, the LW System will focus on integrating weapon subsystem components into the soldier system, providing visual and acoustic access to computer and sensor information, integrating soldier and weapons based night vision capability, providing accurate position location, establishing voice and data transmit/receive capability for critical information exchange requirements, determining soldier location data for navigation, enhancing individual soldier nuclear, biological, chemical (NBC) and ballistic protection, and integrating upgraded soldier load carrying equipment. The result of successful development and integration of these capabilities will be small units able to better pre-arrange the conditions of the fight prior to contact and strike with decisive maneuver once contact is decided upon.

1.5 Supporting Analysis (Appendix D - Summary of Analysis).

1.6 Description of Missions: The LW equipped unit will be employed as part of a task organized, combined arms team. The LW system will link the dismounted soldier and small unit within the digital battlefield. The LW System will provide the means to enhance unit combat power across the spectrum of tactical actions, missions, and

operations. Infantry unit design enables the force to achieve dominance across the full scale of contingencies from Stability and Support Operation (SASO), Small Scale Contingency (SSC) to a Major Theater of War (MTW). Tasks associated with these mission areas require a system that enables success in close combat. Two critical conditions invariably influence success in close combat. The first is the dismounted force's ability to pre-arrange the conditions of the fight to friendly advantage. The second is the ability to strike the enemy with decisive maneuver while limiting the enemy's ability to effectively engage friendly forces.

1.6.1 Pre-Arranging the Condition of the Fight.

1.6.1.1. Friendly forces must be able to develop the situation out of contact prior to making physical or visual contact with the enemy. To do so, every tactical formation down to the individual level must have access to real time information on the terrain, obstacle, and the composition and disposition of relevant enemy and friendly units. The threshold LW (to be clearly defined in paragraph 1.5.8 Evolutionary Acquisition) system will develop the situation within the synergistic capability of the squad, platoon and company, enhanced by intelligence, surveillance, and reconnaissance information assets of LW equipped battalion staff. This will provide small unit leaders greater capability to rapidly modify tactical plans, plan more robust combat power synchronization and maintain an overall higher operational tempo.

1.6.1.2. While out of contact, LW equipped forces continue to have access to timely information. This is enabled through efficiently receiving and disseminating critical information at the appropriate level of command. LW equipped soldiers will maintain freedom of action and rapid tempo by receiving situational awareness and displaying this information in such a manner that allows rapid adjustments to the maneuver plan. Sensor equipment (day, thermal sights, lasers) integrated onto the soldier's primary weapon provide the small unit the inherent ability to generate and immediately distribute situational awareness information in order to provide the force enhanced situational understanding. A modular soldier load capability, integrated soldier load management, and ergonomically correct placement of LW components on the soldier's body combine to reduce fatigue and directly preserve combat power for the close fight. The threshold system, supported by a LW equipped Battalion Staff, more accurately assesses enemy disposition and is better enabled to support the commander's intent in the close fight by maneuvering to a position of advantage out of contact.

1.6.2. Strike the Enemy with Decisive Maneuver.

1.6.2.1. The Infantry battalion applies its combat power to produce overmatching effects at the decisive time and place to defeat the enemy and accomplish its mission. Subordinate units are employed as the primary elements of the battalion's combat power against specific decisive points, key forces, and capabilities within the battalion. Within the scope of battalion operations, companies, platoons, and squads must maximize their ability to choose decisive engagement from positions of advantage, employing and synchronizing fire and maneuver that culminates in tactical assault to

finish the engagement followed by a rapid transition to exploitation and pursuit. LW units will be expected to execute the traditional forms of maneuver of penetration, frontal attack, envelopment, turning movement, and infiltration. A LW equipped small unit will be better enabled to rely on forms of maneuver requiring greater precision while avoiding engagements such as the frontal attack that are characterized by minimal maneuver precision and marginal situational understanding of enemy disposition and intent.

1.6.2.2. As a component of a higher command achieving superior knowledge and operating in the context of an air/ground team, the LW unit chooses the time and location of decisive engagement. These attacks are originated by continuing maneuver from established positions of advantage. Once forces are decisively engaged, the primary purpose of any infantry based force is to close with and destroy the enemy. The intent of LW equipped soldiers is to maximize the small unit's capability to act first and finish decisively. Exploiting situational awareness, leaders will better synchronize maneuver and provide accurate supporting fires. The LW capability will minimize the difference in day and night operational tempo by providing soldier and unit maneuver control unprecedented in typical limited visibility tactical assaults. The LW equipped soldier will be more survivable in the close fight through the ability to fire his weapon from a reduced exposure position. The soldier's sight picture is transmitted to remote display, thereby reducing head and shoulder exposure during the direct fire engagement. The LW soldier will also integrate survivability improvements such as improved body armor and chemical protective over-garments.

1.7 Operational and Organizational (O&O) Description. The LW System will enable Infantry small units, under the control of maneuver companies and battalions, to dominate conventional and/or asymmetrical threats, in close combat through improved lethality, survivability, mobility, and sustainment. The LW System will also provide small units, individual combatants, and leaders improved tactical (situational) awareness, understanding, and command and control. LW enables small units and leaders within digitized or non-digitized forces to conduct distributed operations as they close with and destroy enemy forces. Small units become an integrated system of systems (weapons, sensors and communications). This structure enables these units to be more combat effective in the extended battle space expected to be the norm in future contingencies and in urban terrain where both combat and SASO will increasingly occur. LW equipped small units will eventually be capable of providing sensor to shooter linkages, electronic exchange of urban architectural and infrastructure data (i.e., building diagrams, city maps, key utilities, etc.). Units equipped with LW will have the capabilities to share communications vertically and horizontally, monitor the movements of small unit combatants, accurately control organic and supporting fires, and fight dispersed, allowing them to operate within the Force XXI Light Division O&O framework. As a result of greatly improved tactical awareness, the LW equipped small units will be able to know where each unit/combatant is, and will have greater knowledge of the enemy situation. As small unit network security issues are resolved, these units and combatants will receive information from other sensor subsystems and external sources in support of the close fight. Infantry Airborne, Air Assault, IBCT, Light, Mechanized, and Ranger maneuver battalion small units (platoons, squads, and fire teams), and those soldiers in

direct support of LW equipped units (i.e., Combat Engineers, Forward Observers, Fire Support Teams, and Combat Medics) will be equipped with LW. The U.S. Marine Corps (USMC), Cavalry Scouts, and Special Operations Forces (SOF) may also employ LW. The LW equipped Infantry force will be employed across the full spectrum of military operations. LW is first and foremost a close combat fighting system; it will provide organizational enhancements to all types of Infantry units in lethality, survivability, tactical awareness, mobility sustainability, and training. Infantry maneuver battalion and company organizations perform command and staff functions and are structured in accordance with each type of Infantry organization. Companies are composed of platoons and support elements. Both battalions and companies may be supplemented by attachments or task organized into task forces.

1.7.1 Force Benefit. The LW System provides units of action critically needed capabilities in legacy and initial/interim forces to accomplish assigned combat tasks. LW, beginning at the small unit level, provides:

1.7.1.1 A common tactical picture of the close fight; enhanced control in the close fight between maneuver and support elements, and between dismounted and mounted elements; accurate and timely sharing of voice, data, and graphical information, and mutual tracking of individual locations, enabling tactical understanding at all levels. This allows units to see first, act first, win decisively, and prepare for the next mission.

1.7.1.2 Increased survivability of units through enhanced tactical awareness and understanding, individual (body armor) and collective force protection (unit dispersion in the close fight, protected or reduced fire engagement, individual locations and tracking), and reduced incidences of fratricide.

1.7.1.3 Sustained combat power through engineering design of a robust electronics system. System built in diagnostics and fault isolation reduces the need to evacuate total systems but focuses on fault identification at the small unit level enhanced by rapid reporting of repair needs.

1.7.1.4 Increased small unit lethality through controlled, efficient maneuver combined with a greater ability to mass combat power (direct and indirect) at the proper point and time.

1.7.1.5 Increased movement efficiency through accurate visualization of the battlespace at all levels, integrated navigation, load reduction, and thermal and image intensification sensors, which enables units to move farther, faster, and fight longer.

1.7.2 Employment. The LW System will be employed by dismounted soldiers fighting within a task organized infantry company. Battalion command elements and primary staff will employ LW to the extent that these soldiers will be dismounted and separated from their main command post or other assets that can host and transport other digital command and control capability ("light digital tactical operations center (TOC)"). The threshold capability is targeted to provide operational effectiveness improvement to

the dismounted squad, platoon, and company. LW equipped Infantry maneuver companies and small units will conduct offensive, defensive, and stability and support missions across the full spectrum of military operations.

1.7.2.1 Offensive operations seek to seize, retain, and exploit the initiative to defeat the enemy decisively. Battles may be linear or nonlinear and conducted in contiguous or noncontiguous areas of operations. Infantry forces (companies, platoons and below) will utilize the LW threshold system capability within the LW to evolve small unit tactics from deliberate operations designed to find the enemy; react to contact and seize objectives to an operational environment of developing the situation largely out of contact; maneuver to positions of advantage out of contact while retaining freedom of maneuver; and conclude by conducting decisive combat at the time and place of friendly force choosing.

1.7.2.1.1 LW equipped units are more capable of developing the situation out of contact through access to timely information to build situational awareness. Situational awareness establishes a common operating picture in a tactical unit to ensure soldiers in the force know where they are, know where their unit members are, and as information is acquired or disseminated from a higher command, where the enemy is located. The primary requirements that will drive enhanced capability are a networked small unit information infrastructure that generates and routes critical information to soldiers and leaders combined with a near real time visual friendly and enemy common operating picture that provides key leaders the means to determine required adjustments to the tactical plan. LW key leaders located at the Bn staff will review and update the enemy common operating picture. LW leaders will also update a friendly common picture scaled to their area of operations. The LW equipped soldier observes his sector and provides activity reports. Subsequent blocks of the LW program evolve system capability towards full ABCS interoperability across the IBCT force structure and further set a process to evolve toward the Objective Force Warrior.

1.7.2.1.2 LW equipped forces are better enabled to maneuver to positions of advantage out of contact while retaining freedom of maneuver through the enhanced capability of soldiers and leaders having near real time access to a tailored friendly and enemy common operating picture. Enemy locations either become known prior to contact or once contact is made. Leaders can choose alternative schemes of maneuver that do not rely on significant forces to fix an enemy prior to unit movement to destroy the enemy. Given a broader tactical perspective that generates situational understanding, leaders will have the option of retaining freedom of maneuver and protecting the force to attack more dangerous targets first rather than simply react to contact enroute to an ultimate objective. Maneuver units will be able to more effectively identify assailable flanks and positions of advantage through knowledge of the enemy's dispositions and posture. Commanders will have greater insight into and control over the most effective time to conduct maneuver. Better knowledge further permits commanders to choose the best routes to the objective area with respect to stealth, speed, and momentum. Through the confidence built by knowing the locations of friendly force in day or night, small unit agility is enhanced. More complex movements can be

accomplished to gain positions of advantage with the distinct force protection improvement of being able to rapidly synchronize shifts in the maneuver plan with adjustments to supporting fires. .

1.7.2.1.3 Decisive operations are ultimately based on tactical success in close combat. LW equipped units must be effective in closing with and destroying the enemy and seizing and controlling key terrain. The key aspect of close combat tactical actions will be the ability for LW equipped units of action to integrate firepower, maneuver, and assault to win the close combat fight wherever the enemy is found. During contact, LW equipped small units will maneuver to positions of advantage, initiate decisive contact at the chosen time and place while integrating fire and maneuver. Through the integrated capability provided to LW soldiers in the close fight, small units will be able to employ speed, stealth, and deception to avoid detection, protect movement, retain freedom of action, engage enemy forces while en route, and build momentum. The LW equipped unit adapts on the move, adjusting routes and objectives based on changes to the situation, fighting the enemy, not the plan. The LW tactical assault is characterized by highly precise and synchronize fire and maneuver. Support by fire elements have exact personnel location and can place effective suppressive fire on distinct locations. Indirect fire assets are more precisely synchronized due to a clear visualization of all soldiers in the assault that will provide an unambiguous front line trace from which to initiate supporting fires. The net effect is that LW equipped soldiers firing the most casualty producing weapons should use much less ammunition to achieve greater effect. LW equipped soldiers also have the option to seek greater cover and place effective small arms fire on targets through use of an indirect weapons viewing and aiming capability. The LW equipped unit seeks to engage the enemy one time, denying him the opportunity to retreat and reconstitute. This goal requires both close assault and finishing actions that continue contact with retreating forces to destroy them in detail.

1.7.2.2 The purpose of defensive operations is to defeat enemy attacks with the desired end state to buy time, economize forces, and develop conditions favorable for resuming offensive operations. Defending forces await the attackers blow and defeat the attack by successfully deflecting it. All phases of defensive operations are enhanced through tactical awareness, providing a common tactical picture throughout the entire defense. The LW equipped unit is enhanced in defensive preparation through collaborative planning within the unit and coordinated execution of available direct, indirect, and intelligence, surveillance, and reconnaissance elements enhances small unit lethality within depth of the battlespace. LW capabilities provide a combat multiplier in the conduct of a defense, enabling early detection of the enemy force and rapid reporting and dissemination of information. As the threat advances, it is attacked with precision from protected positions, through maneuver and indirect fire support, in support of the close fight. The result is the disruption of the attacker's tempo and synchronization with actions designed to prevent them from massing combat power. Tactical awareness and understanding, coupled with combat identification capabilities, enhances the LW equipped force ability to mass effects of overwhelming combat power within a wide variety of battlefield conditions. A characteristic of defensive operations is that commanders accept risk in some areas to mass effects elsewhere. The common operating

picture containing both friendly and enemy situational awareness capability enables commanders to mitigate risk given the ability to better discern enemy disposition and intent.

1.7.2.3 Stability and Support Operations (SASO). In accordance with U.S. national military strategy and as evidenced by current and recent military operations, the Army will continue to be involved in SASO. Stability operations promote and protect US national interests by influencing the threat, political, and information dimensions of the operational environment. Support operations are usually non-linear and non-contiguous. Commanders designate the decisive, shaping, and sustaining operations necessary for mission success. In support operations the enemy is often disease, hunger or the consequences of disaster. Although the LW System was designed primarily as a combat system to provide Infantry maneuver battalion, companies, small units, and individual combatants an overmatch capability against enemy forces, it also provides flexibility for employment across the full spectrum of military operations.

1.7.3 Organizational Description. There are six types of Infantry platoon organizations. Each is organized similarly, but have some differences. All have a platoon headquarters with a platoon leader, platoon sergeant, radiotelephone operator (RTO), an attached forward observer and a combat medic. All have three rifle squads, and all have machine gun and/or anti-armor sections separate from the rifle squads and under platoon leader control. Differences among the platoons concern the numbers and locations of machine guns within the platoon, and the fact that the airborne and air assault platoons have a platoon level anti-armor section in the weapons squad. The mechanized and IBCT platoon's three rifle squads are transported in their respective vehicle assets and will fight either dismounted or remain mounted.

1.7.3.1 All rifle squads are identical. All are authorized nine individual combatants: a squad leader and two identical fire teams consisting of a team leader, an automatic rifleman, a grenadier, and a rifleman. Squad equipment may vary in accordance with the mission and parent organization requirements.

1.7.3.2 The fire team is the Infantry's (and the Army's) basic element of fire and movement, with one fire team providing a base of fire while the other team moves to a more advantageous position to accomplish assigned tasks.

1.7.4 Other Systems To Interact With. The threshold LW equipped soldier will initially interact within special operations and conventional forces of the combined arms team but will only share digital information with other similarly equipped soldiers. As network security issues are resolved, future blocks of the LW Program will provide extensive interoperability to include sharing information with the Force XXI Battle Command Brigade and Below (FBCB2) system. The LW equipped soldier, when a component of legacy or interim forces, will utilize the carrier vehicle for power sustainment and situational awareness linkages. LW communications (i.e., Wireless Local Area Network (WLAN)) and advanced combat net radios (CNR) work in conjunction with legacy communications (e.g., Single Channel Ground and Airborne

Radio System (SINCGARS)) at the battalion and below level. As security issues on mixed networks are resolved, interoperability requirements will be implemented and blocked to enable interface with existing and proposed command, control, computers, communications, intelligence, surveillance, and reconnaissance (C4ISR) systems in primarily Army, joint and multinational activities (e.g., "FBCB2 like," Tactical Internet, Army Battle Command Systems (ABCS), etc). Interfaces will be echelon and situation dependent. Tactical information to include intelligence, surveillance, and reconnaissance capabilities enable decentralized execution of operations, collaborative planning, synchronization, force protection, current mission execution, continued situation development, and mission planning for subsequent combat tasks among subordinate units and systems, peers, combat support, combat service support, and higher units.

1.7.5 Support Needed.

1.7.5.1 LW units will be supported logistically by both military and contract personnel using the most cost and operationally effective means available during peacetime with acceptable risk when in transition to wartime.

1.7.5.2 The LW System will be fielded to units and maintained under a field and sustainment support structure. Field level maintenance - includes tasks such as preventive maintenance checks and services (PMCS) by the operator in accordance with appropriate –10 series technical manuals, the conduct of built-in-test (BIT) checks, fault identification and the replacement of inoperative components and designated line replaceable units (LRUs). LW equipped units must have limited stocks of operational spares. Component repair will be performed by a sustainment maintenance activity. Sustainment maintenance activities will repair and return LRU and subassembly repairable unit/shop replaceable unit (SRU) components back to the supply system.

1.7.6. Command, Control, Communications, Computers, Reconnaissance, Surveillance, and Intelligence (C4ISR). The situational awareness and communications systems of the LW system/equipped unit must be capable of interfacing with existing and proposed C4ISR systems in primarily Army, joint and multinational activities (e.g., "FBCB2-like," Tactical Internet, ABCS, etc). As security issues with mixed networks are resolved, LW equipped Infantry maneuver battalions will have the ability to network (send and receive information, obtain information from databases) and interact with, and among, subordinate units and systems, peers, combat support, combat service support, and higher units. Specific interfaces will be echelon and situation dependent. The ability to network and collaboratively generate combat power creates an operational structure that is redundant and allows the combat battalion to maintain momentum of operations even if connectivity is temporarily lost during contact.

1.7.7 Inter-Service or Allied Cooperation. The Infantry Center and the Project Manager – Soldier Systems are aware of, and are monitoring, the development of "LW - like" capabilities of other services, allies, and nations. The potential exists for sharing, leveraging, or interfacing with these programs to support LW Program goals. The U.S. Army Special Operations Command's SOF Personal Equipment Advanced Requirements

(SPEAR) program is an effort to rapidly field successive lightweight and advanced SOF unique components of clothing and individual equipment while integrating them into a tailorable system. The USMC is conducting a series of experiments to identify potential Marine Corps requirements that could be met by the LW Program. The USMC is preparing a capstone requirements document for an integrated Infantry combat system, which will lay the framework for a formal leveraging of efforts between the U.S. Army and the USMC for the modernization of the infantryman. Further, there are a number of allied and other countries that are exploring an integrated soldier system. Their efforts generally fall into two categories: 1) fielding a system that integrates everything worn, carried, or consumed for individual use on the battlefield; and 2) adaptation of current technology for military uses.

1.8 Time Phased Requirements in Support of Evolutionary Acquisition. LW requirements definition will implement evolutionary acquisition to first field a core capability with an open structure that provides for future increments in capability upgrades. Land Warrior is dependent on communications, position location devices, sensors, range finding and direction determining capabilities and interface with organic weapons at the Infantry platoon and company level. The first LW requirements definition is designed to build and field the minimum acceptable system necessary to satisfy initial warfighting needs based on threat and mission requirements. Subsequent blocks upgrade previous versions as well as introduce new capability oriented again on threat, mission requirements and unit type. The LW requirements structure is specified in three blocks that conform to the Army Transformation plan.

1.8.1 Block I requirements are the minimum essential capabilities needed to prosecute the close fight and are primarily focused for light and special purpose units at Battalion and below. These requirements will enable the Land Warrior equipped unit to enter contact at a time and place of choosing, continue to overwhelm the enemy with fire and maneuver, and finish the enemy with tactical assault. Key to these capabilities are the ability to provide LW equipped soldiers changes in orders (Fragmentary Orders), essential graphics for the fight, friendly and enemy target locations, position and orientation as well as the capability to engage the enemy at maximum effective range of the small arms direct fire weapon system. Achieving this block depends upon the soldier radio, position location devices, network management, approved data structures, laser range finder, heading reference capability and proper interface with organic small arms weapons in the Infantry platoon and company.

1.8.2 Block II requirements are the minimum essential needed to provide capabilities to enable the Land Warrior soldier to prepare for the dismounted fight while still mounted in the Interim Force Vehicle. These requirements will enable Land Warrior equipped soldiers to effectively develop the situation while moving mounted and give key leaders the ability to effectively communicate and update the tactical plan. A decrease in soldier load will enhance the Land Warrior Soldiers ability to achieve faster march rates and reduce energy expenditure during tactical movement. The improved power source with the ability to recharge from the Interim Force Vehicle will help reduce the soldier load, decrease the logistics footprint by not requiring as many batteries for

resupply and provide an improved power source. Achieving this block depends upon interoperability with ABCS, innovative lightweight materials for Modular Load Equipment, and a recharging capability for the interim force vehicle with a Land Warrior interface.

1.8.3 Block III will provide full interoperability with ABCS at all levels. The requirements in Block III will evolve into the Objective Force Warrior (OFW) that is the desired full capability system. The Block III requirements will be defined after the Analysis of Alternatives and initial testing of the Block I system. Once better defined, the Objective Force O&O Concept and Operational Architecture will also contribute to the development of the Block III requirements. These processes are ongoing and scheduled in the future; therefore, specific Block III requirements are premature but will be provided prior to the Block II Milestone C decision.

2.0 Threat.

2.1 Threat to be countered. Since an individual soldier will use the LW system, the primary threat encountered will be the same threat as to that soldier. Threats will range from small bands of insurgents, to organized regional factions, to major military powers capable of conducting small-scale adaptive operations, to conventional and Special Forces operations. Because of growth in urban areas, the LW will operate more frequently in urban settings. The threat encountered will also include light armored personnel carriers (M113A1, BTRs, BRDMs), infantry fighting vehicles (BMPs1-3) and other modified personnel/infantry vehicles.

2.2 Threats to the system. The primary threat to the LW system and its user are fragments, bullets, blast, thermobaric, flame, and incendiary weapons. Threat systems and technologies may include lasers, laser range finders, image intensification, active and passive infrared, electronic countermeasures, and other improved Reconnaissance, Surveillance and Target Acquisition (RSTA) measures. Threat artillery will employ a full range of ordnance, including use of chemical, biological and scatterable mines. The soldier equipped with the LW will always be subject to direct/indirect fire.

2.3 Projected threat environment. The LW system will be employed throughout the entire spectrum of warfare, from Stability and Support Operations (SASO) to Small Scale Contingencies (SSC) to Major Theater War (MTW). The most likely environment in which U.S. forces equipped with the LW will operate is the SSC. The SSC will be characterized by U.S. forces being committed to short-notice, early entry operations in complex and urban terrain, lack of front lines, insecure flanks, dismounted combat, constantly-fluctuating situations, with the possibility of rapid transition into regional or MTW. Thus, while U.S. forces could face the full spectrum of possible threats, the primary threat, which will be encountered across the spectrum will be dismounted soldiers, often mingled with non-combatants, equipped with lethal small arms systems.

2.3.1 Operations in complex terrain and urban environments alter the basic nature of close combat. History tells us that because of the close proximity of forces,

engagements will be more frequent and occur more rapidly. They will be more manpower intensive and less system centric. There will be greater opportunity for surprise, and loss of contact with the enemy will have greater consequences than in more open environments. Extensive Human Intelligence (HUMINT) networks that are more effective than technical intelligence, surveillance, and reconnaissance in these environments, will provide opponents with equal or greater situational awareness. Lines of communication will be more difficult to secure on a continuous basis and Combat Service Support (CSS) units will be more vulnerable.. There will be no sanctuary for force reorganization and regeneration. Ranges of weapons and target acquisition systems will be significantly reduced, degrading the advantage provided by standoff warfare. Maneuver warfare, with greater precision over shorter distances, will be required.

2.3.2. Within the complexities of this environment, adversaries will attempt to force units into rapid and continuous transitions between types of tactical operations to create windows of vulnerability. Non-contiguous enemy actions within the tactical battlespace will force rapid changes in organization for combat. The enemy will seek to create conditions for which the unit is not properly prepared either in organization or in planning. Battle will be more or less continuous. Finally, future enemies will probably have somewhat less advanced systems; systems we discounted because of range limitations or age. In complex terrain and urban settings, these systems (such as mortars and Rocket Propelled Grenades (RPG)) may again find effective uses and become factors to be reckoned with.

2.3.3. The enemy will be difficult to template as he adapts and attempts to create opportunity. He will develop patterns of operation that will change as he achieves success or experiences failure in engagements. His doctrine won't change but his way of operating will. There is little likelihood that U.S. forces will face an enemy who is predictably echeloned in depth, and attempts to destroy us with actions based purely on mass and momentum as most doctrines call for. Instead, as stated earlier, potential enemies will exploit complex terrain and urban environments to obtain tactical advantage and offset our technological and range advantages. He will conduct decentralized, dispersed, or distributed operations in an attempt to throw U.S. units off balance. He will set sophisticated ambushes using established conventional operations to lure units into kill zones. Civilian populations will be used as obstacles and sanctuary to shape the battlefield. In general, today and for the foreseeable future, the disposition of enemy forces, as well as close combat means and methods will be less predictable.

2.4 The baseline threat document for the LW is the LW System Threat Assessment Report (STAR) dated Jun 98 and the current draft LW STAR under review.

3.0 Shortcomings of Existing Systems and C4ISR Architectures.

3.1 No integrated system currently exists to overcome deficiencies in current equipment issued to small unit and individual Infantry combatants. The legacy dismounted force is not capable of being fully integrated with the command and control

system of the light infantry TOC or the existing digital architecture in heavy Army formations.

3.2 Units of action at battalion and below have limited capability to synchronize fire and maneuver. At the small unit level, fire and movement cannot be fully synchronized with key combat multipliers designed to support tactical operations.

3.3 Ambiguity of the tactical situation can exist during light force operations prior to contact. Once contact is made, fire and movement is restricted and fire support measures have limited effect based on the reliance on physical control (visual, voice) measures to avoid fratricide and ensure the force maintains orientation of the proper objective.

4.0 Capabilities Required. Small unit lethality increases will be achieved initially by developing an integrated system that introduces new capability while also integrating equipment currently fielded or in development for the Infantry force. The LW equipped soldier will be task organized and employed as a member of the combined arms team. Capabilities for LW are categorized operationally into six areas; overall system, situational awareness, lethality, survivability, mobility, and sustainability.

4.1 Block I KPPs. Block I defines a threshold LW System capability and will be fielded as the common element of a LW equipped unit. LW System requirements are structured to ensure ABCS technical compatibility as a threshold requirement and will build to interoperability when aligned with solutions to mixed network security within the supporting C4ISR infrastructure at the proper point in time. Block I also establishes a baseline soldier load to begin a total system management process to requirements development and equipment fielding to dismounted soldiers. Block I requirements support the following key performance parameters and data exchange capabilities:

Key Performance Parameter	**Block I Threshold and Objective**
KPP 1: Common Picture (Situational Awareness)	Integrate and manage system functions, provide the ability to communicate and share tactical information (voice and data) with other LW equipped formations and echelons. Use a message format structure that is compatible with Army Battle Command Systems (ABCS) (Threshold). Provide ABCS interoperability with ABCS equipped (e.g. FBCB2) systems. (Objective)
KPP 2: Mobility	Given a baseline soldier capability requirement, establish a soldier total load that is no greater than 92.576 lbs. (Threshold) / 85 lbs. (Objective).

Table 4-1. Block I KPPs.

Key Performance Parameter	**Block I Threshold and Objective**
KPP 3: Sustainability (Power)	Provide a system power source and integrate system power management to achieve a system battery life of 12 Mission Hours with a disposable power source that weighs no more than 2.0 lbs. (Threshold) / 24 mission hours (weight independent) (Objective).
KPP 4: Sustainability (Reliability)	The LW contractor furnished equipment (CFE) shall have a probability of at least .92 of operating for 12 hours without incurring a mission affecting failure (Threshold) / 0.93 for a leader system and 0.94 for the soldier system of operating 12 hours without a mission affecting failure (Objective).

Table 4-1. Block I KPPs (continued).

4.1.1 KPP 1 Common Picture (Situational Awareness). This KPP is achieved when all critical IERs are met. To provide a common operating picture, the LW System will integrate and manage system functions, provide the ability to communicate and share tactical information (voice and data) with other LW equipped formations and echelons, and use a message format structure that is compatible with ABCS. Specific critical information exchange requirements are identified in Table 4 6includes Position Report, Spot/Salute, Field Orders, Overlay Message and Free Text.

***RATIONALE**: Force-on-force modeling results demonstrated that LW equipped small units were much more effective than current (2003) soldiers. This was primarily due to collaborative planning, communications throughout platoon, and tracking of selected individuals. Further, less face-to-face coordination was necessary, less physical movement, troop leading procedures were executed in less time, and less overall time taken to execute changes. Additionally, greater control of supporting fires, less danger of fratricide, more freedom of action, tactical awareness at soldier and small unit level, and a common, near real-time picture of the battlefield were demonstrated. These capabilities improve performance of collective tasks, to enhance battle outcome in the "close fight." The result is overall enhanced force effectiveness and accomplishment of a unit's mission on terms favorable to U.S. Forces.*

4.1.2 KPP 2 (Mobility). Given a baseline soldier capability requirement, based on the current soldier load outlined below in Table 4-2, establish a soldier total load that is no greater than 92.576 lbs. (Threshold) / 85 lbs. (Objective).

***RATIONALE:** For every ten percent load reduction, soldiers will increase squad/team optempo by approximately 1 mile in an eight-hour period resulting in a capability to reach objectives in a shorter period of time and improve small unit operational effectiveness. A critical aspect of the LW system is the integration of electronics with new and legacy items to establish a soldier as a system management process. The threshold*

operational goal is for LW equipped soldiers are to maintain equivalent soldier loads when compared with their non-LW equipped counterpart; given similar missions and METT-TC analysis. In order for legacy equipped soldiers to establish the capability that LW capability requirements stipulate, a legacy soldier would typically be configured as depicted below. It is important to note that this soldier configuration is capability based and would not provide any level of system integration.

Items/Capabilities	***Weight (lbs)***
1 X PASGT Helmet (medium) w/Suspension System, Parachutists Pad, Chinstrap, Helmet Cover, and Helmet Band	*3.392*
1 X Load Bearing Vest, 1 X Individual Equipment Belt, 1 X First Aid Pouch w/ Kit, and 2 X Ammo Pouches	*3.494*
2 X 1 Quart Canteens of Water, with Covers, with 1 X Canteen Cup	*5.9*
1 X ALICE Field Pack (medium) with Frame	*6.3*
1 X Chemical Protective Battle Dress Overgarment w/ 1 X pair of Chemical Protective Overshoes, and 1 X pair of Chemical Protective Gloves	*10.1*
1 X M40 Protective Mask with Carrier	*3.8*
1 X M4 Modular Weapon System w/ 1 X 30 Round Magazine	*7.4*
6 X 30 Round Magazines	*6.0*
2 X M61 Fragmentation Grenades	*2.0*
1 X M18 Smoke Grenade	*1.2*
1 X Bayonet w/ Scabbard	*1.8*
1 X Close Combat Optic w/ Rail Grabber and Spacer	*1.4*
1 X AN / PAQ - 4B/C Aiming Light w/ Grabber and Spacer	*.6*
1 X PASGT Vest and 2 X ISAPO Plates	*25.1*
1 X BLPS	*.1*
1 X AN/PVS-7B w/ Soft Case and Extra Batteries	*2.0*
1 X DECON Kit, Wet Type	*.1*
1 X Soldier Intercom	*.94*
1 X PLGR	*2.75*
1 X Meal, Ready to Eat	*1.5*
1 X Flashlight	*.8*
1 X Weapon Cleaning Kit	*.8*
1 X Antidote Mark 1 - Nerve Agent	*.5*
1 X Face Paint Camouflage	*.1*
1 X Entrenching Tool	*2.5*
1 X Box Matches	*.2*
1 X Wrist Watch	*.3*
1 X Toilet Articles	*1.5*
Total	*92.576*

Table 4-2. Current Soldier Load

The intent of the above configuration is to provide a common, manageable program baseline. Utilizing a similar analysis for a LW equipped infantry rifle squad, a typical LW soldier's load is expected to be similar to the table below. The LW soldier's load depicted in Table 4-3 improves mobility by reducing weight of body armor/ballistic protection and increases crew/team optempo capabilities. Selected LW squad members will have increased target recognition/acquisition and improved communications capability as depicted in TABLE 4-4.

Items/Capabilities	***Weight (Lbs.)***
Fighting Load	
Battle Dress Uniform, boots, socks, knee/elbow pads, underwear	*8.6*
Modular Integrated Communications Helmet (MICH)	*2.9*
Modular Lightweight Load-Carrying Equipment (MOLLE) Fighting Load Carrier	*3.2*
3 Quarts of Water Contained in "On the Move" Carrier	*7.4*
1 X M45 Protective Mask with Carrier	*3.1*
1 X M4 Modular Weapon System w/ 1 X 30 Round Magazine	*7.4*
6 X 30 Round Magazines	*6.0*
2 X M61 Fragmentation Grenades	*2.0*
1 X M18 Smoke Grenade	*1.2*
1 X Bayonet w/ Scabbard	*1.8*
1 X Interceptor Body Armor	*8.4*
1 X Ballistic/Laser Eye Protective System (BLPS)	*.1*
1 X AN/PVS-14 night vision goggles	*1.2*
1 X Wrist Watch	*.1*
Sub-Total	*53.4*
Approach March Load	
1 X MOLLE Patrol Pack	*3.4*
Joint Services Lightweight Integrated Suit Technology (JSLIST)	*9.6*
1 X Close Combat Optic w/ Rail Grabber and Spacer	*1.4*
1 X DECON Kit, Wet Type	*.1*
1 X Meal, Ready to Eat	*1.5*
1 X Flashlight	*.8*
1 X Weapon Cleaning Kit	*.8*
1 X Antidote Mark 1 - Nerve Agent	*.5*
1 X Face Paint Camouflage	*.1*
1 X Entrenching Tool	*2.5*
1 X Toilet Articles	*1.5*
Sub-Total	*22.2*
Total	*75.6*

Table 4-3. LW System Load

LW program integration items unique to specific squad members are listed below and would be additive to the above weight.

Lightweight Thermal Weapon Sight (LTWS)	*1.6*
Medium Thermal Weapons Sight	*4.5*
Multi-Functional Laser	*1.9*
Hand Held Display Device	*1.45-2.65*
Long Range Radio	*2.4*

Table 4-4. Position Dependent LW Additional Items

The intent of these tables is not to establish a firm LW electronics weight but to demonstrate that soldiers will not assault objectives at all times at 92.576 pounds. Given that the LW program intent is to provide the materiel developer flexibility to manage all soldier items as an integrated process, specific item-by-item weight allocations have been avoided. The fully equipped LW soldier, however, should maintain an equivalent weight of a currently equipped soldier in the same duty position. Based on adhering to the design KPP, the combat developer expects the end state soldier fighting load to be in the range of 66 to 85 pounds. An Initial weight analysis indicates that legacy and LW soldier loads will be equivalent; some duty positions lighter and some slightly heavier. This weight range is independent of mission unique equipment. Such equipment would affect all soldiers equally. The evolutionary acquisition goal for the LW System is to enhance the soldier with new capabilities while decreasing his fighting load.

4.1.3 KPP 3 Sustainability (Power). Provide a system power source and integrate system power management to achieve a system battery life of 12 Mission Hours with a disposable power source that weighs no more than 2.0 lbs. (Threshold) / 24 mission hours (weight independent) (Objective).

RATIONALE: *The fielding of separate items of equipment for individual soldiers has been done with little consideration for the cumulative increase to the weight carried by troops. This unchecked weight growth has been due in part to the lack of centralized soldier system management. Initial theatre entry sustainment goal is for the unit to be self sustaining for 72 hours. Typical light force logistical resupply occurs every 24 hours. Given the state of battery technologies, a single 2 lb disposable battery can provide 12 hours of power, which is what is achievable by initial fielding. The LW System requires two batteries to provide power for 24 hours. Emphasis on new power sources and weight reduction will be closely linked in system design evolutions. In each succeeding time phase, power sources last longer, and impose less logistical burden.*

4.1.4 KPP 4 Sustainability (Reliability). The LW CFE soldier ensemble shall have a probability of at least 0.92 of operating for 12 hours without incurring a mission affecting failure (MAF); as defined in the Failure Definition and Scoring Criteria.) (Threshold). The LW CFE shall have a probability of at least .93 for a leader ensemble and .94 for a soldier ensemble of operating 12 hours without a MAF (Objective). This will occur during tactical operations conducted in accordance with the equipment usage profiles described in the Operational Mode Summary/Mission Profile (OMS/MP) for the

Military Operations On Urbanized Terrain (MOUT) attack, MOUT defense, Night Attack, and Defense missions.

RATIONALE: *The leader ensemble MAF of .93 provides additional communications capability for leaders that enables the leaders pass and receive secure graphics, reports, and orders. The leader ensemble has a small computer and keypad that is not needed by soldiers. This requirement will ensure that the LW system (comprised of GFE in addition to the developmental CFE) is sufficiently reliable to permit the execution of assigned missions without incurring undue risk of unit mission failure and threat to life because of equipment malfunction. The required threshold CFE reliability combined with the established GFE reliability of .975 (derived from the mean time between mission affecting failure (MTBMAF) of 465 hrs for the GFE, as documented in the Materiel Developer's Technical Feasibility Analysis of LW Reliability and Maintainability (R&M)) will enable the total LW System (the CFE and GFE combined in a series functional relationship) to complete the high intensity attack/defense missions (each involving up to 12 hours of system operation) 90 percent of the time without incurring a MAF (.92 CFE Reliability x .975 GFE Reliability = .90 System Reliability). The requirement will ensure that the LW system (the GFE + developmental CFE) is capable of achieving a combat readiness of 90 percent (commensurate with the operational readiness criteria for category I combat units defined in AR 220-1) based on the established CFE maintenance concept to be utilized in concert with the existing GFE support concept. Analytical details (in-depth analysis and rationale) are documented in the Combat Developer R&M Analysis.*

4.2 Block I Non-KPP Requirement - System Performance. The following are the System characteristics and capabilities required by a LW materiel solution.

4.2.1 The LW System will be configurable to function in the temperature range of a minus 25 degrees F to plus 130 degrees F (minus 32 degrees C to plus 55 degrees C). A winterization kit, if required, is acceptable for operation below 0 degrees F and will not be considered part of the Threshold weight described for the System in a subsequent paragraph of this document.

RATIONALE: *LW will operate across the full spectrum of operations, in all types of environments, and under all battlefield conditions.*

4.2.2 The LW System will be compatible with standard infantry parachuting equipment, and will not be adversely affected by airdrop.

RATIONALE: *LW equipped soldiers and units will be employed to an operational area via numerous methods of transport (ground, air, and shipboard).*

4.2.3 The LW System will be waterproof to a depth of one meter, and operate in salt air and water conditions globally.

RATIONALE: *During fording or stream crossing operations the LW System could be immersed in water up to a depth of one meter. The System will operate under all weather conditions. Submersion proof in one meter of water is the current requirement of SINCGARS and AN/PRC-126 radios.*

4.2.4 LW System, with all components functioning, will be audibly non-detectable (except when weapons are fired, or under Mission Oriented Protection Posture (MOPP) 4) at 15 meters (Threshold) / 5 meters (Objective).

RATIONALE: *This requirement was initially based on the requirement for the Thermal Weapon Sight (TWS) program, which stated that the TWS would not emit light and noise that is detectable in any direction at a distance of beyond 5 meters by an unaided soldier. This requirement was subsequently modified based on operational experience in a tactical environment, and operational comments from soldiers using the LW System.*

4.2.5 The LW System will be able to withstand the shock of the soldier performing individual movement techniques in combat, and the vibrations of being transported in standard military aircraft and ground vehicles.

RATIONALE: *Ensures that the LW remains combat effective in all-operational environments.*

4.2.6 The mean time to repair (MTTR) LW CFE malfunctions/failures will not exceed 1 hour (0.68 hours Objective) for dedicated Table of Organization and Equipment (TOE) maintenance personnel.

RATIONALE: *This mean time to repair (MTTR) requirement will constrain the burden placed on dedicated TOE maintenance personnel by limiting the LW CFE repair time to a level commensurate with MTTR requirements established for baseline infantry equipment/systems (with the intent being to preclude the need for excessive manpower support). The repair of all LW CFE will be performed at the direct support level under the planned maintenance concept; both unit and direct support maintenance personnel will repair the LW GFE in accordance with existing/current support concepts. The required threshold CFE MTTR combined with the established GFE MTTR of 0.83 hours will yield a mean repair time of 0.95 hours for the total LW System (the CFE plus GFE) at direct support [i.e.Total LW System MTTR at Direct Support = {(1.0 Hr CFE MTTR Rqmt x 5772 CFE failure rate) + (0.83 Hrs GFE MTTR x 2140 GFE failure rate)}/{5772 CFE failure rate + 2140 GFE failure rate} = 0.95 Hrs, all failure rates specified in failures per million hrs of system operation]. Unit level repair actions performed by dedicated battalion maintenance personnel in support of the LW GFE will involve 0.35 hours to complete. Analytical details (in-depth analysis and rationale) are documented in the Combat Developer R&M Analysis. The objective requirement is intended to minimize the burden placed on dedicated TOE maintenance personnel through reduction of repair time to the technical limit projected in the Materiel Developer's Technical Feasibility Analysis of LW R&M.*

4.2.7 On-Line fault isolation shall allow the operator to identify a single fault to an ambiguity group of no more than two operator replaceable (configurable) items with at least 80 percent accuracy without user action to modify the system configuration. On-Line fault isolation shall allow the operator to identify a single fault to an ambiguity group of no more than two operator replaceable (configurable) items with at least 95 percent accuracy, if used with guided (operator level) systems reconfiguration directions.

RATIONALE: *To ensure that the LW Systems can execute assigned functions without the risk of mission failure and threat to life because of equipment malfunction. Retains operational tempo by identifying critical functional degradation, for which action can be taken to overcome if known, and minimizing maintenance and supply burdens of mis-diagnosed failures.*

4.2.8 The LW System must provide LW leaders the ability to monitor, through hands-free display and/or hand-held display, the individual soldier's system employment, (i.e., "see what the soldier sees") to help correct system use or error conditions, if practical under operational conditions.

RATIONALE: *Soldier and unit effectiveness enhancement under operational conditions.*

4.2.9 Special Forces Requirements. The LW Program will accommodate unique Special Forces (SOF, Ranger, others) requirements within primary system development when at all possible and in parallel with the baseline system development when not possible.

RATIONALE: *Current Army Order of Precedence provides LW Systems to the 75th Ranger Regiments as the first unit equipped. The program must accommodate unique physical and communications requirements. Actual program requirement management will derive from the Special Operations Command SOC), as well as potential for program funding.*

4.3 Block I Non-KPP Requirement – Situational Awareness.

4.3.1 The System will incorporate a hands-free display, which can be viewed during day and night operations (Threshold). The System will incorporate a color hands-free display (Objective).

RATIONALE: *Hands free displays provide the soldier a visual interface between himself and his System. Information displayed can be from weapon sensors for surveillance and/or target engagement or map and graphics displays essential for planning movement, defensive and offensive operations. Once planned, the grid and map overlay information can be distributed to leaders throughout the chain of command. This provides a better view of the mission to the soldiers while moving tactically. Color will enhance the LW's viewing and interpretation of visual information, and increase effectiveness in combat operations.*

4.3.2 The LW equipped soldier must be able to view the hands-free display with either eye.

RATIONALE: *To accommodate combatants of different eye preferences/ability for visual interface between the man and System.*

4.3.3 The hands-free display must have sufficient resolution to show messages, sight reticles, warning messages, and images from the thermal sight and the Daylight Video Sight (DVS), and maps with overlays and locations of LW equipped soldiers.

RATIONALE: *Hands free displays provide the soldier a visual interface between himself and his System. Information displayed is essential for conducting combat operations, under all battlefield conditions.*

4.3.4 The hands-free display-viewing screen shall resist exposure to dirt and mud. In addition, the viewing screen shall be easy to clean in battle.

RATIONALE: *Hands free displays provide the soldier a visual interface between himself and his System. Information displayed is essential for conducting combat operations, under all battlefield conditions, and must withstand the effects of these conditions.*

4.3.5 The LW equipped soldier must be able to wear corrective eyewear and laser and ballistic protective eyewear while wearing and viewing the hands-free display.

RATIONALE: *To accommodate combatants of different eye preferences/ability for visual interface between the man and System.*

4.3.6 The LW System shall have image intensification (I2) capability. The I2 device will have an independent power source for operational flexibility. The I2 device will be lightweight and will be of minimum length. It will provide a field of view of at least 40 degrees, and permit the soldier to detect a man-size target at 150 meters (starlight), 300 meters (moonlight).

RATIONALE: *The integration of the I2 device provides "own the night" capability that is not currently available to all dismounted soldiers. The I2 accuracy, Field of View (FOV), and range requirements are consistent with the current developments in I2 programs (e.g., AN/PVS-7, and AN/PVS-14). Operationally the I2 device will maintain light signature discipline. Independent power provides flexibility for combatants if the system power is unavailable to non-functional.*

4.3.7 Information Processing. LW System software shall control the LW hardware functions, provide the LW software interface to the soldier, process information, and manage the use of computer resources. LW software shall control the soldier's interaction with LW equipment and sensors, operational data generated or received during the mission, soldier access data, mission data, and reference data. LW

software shall be modular to facilitate maintenance, simplify addition of new functions and capabilities, and rapidly support expanded interfaces. The LW software shall provide interface with all appended or external devices that connect to the System. The LW Soldier/Computer Interface shall be consistently applied to minimize training requirements and maximize efficient manipulation of the interface in a battlefield environment. A power management program shall be provided to assist in reducing power consumption.

RATIONALE: *These capabilities enhance the acquisition, transfer, manipulation, and refinement of information that will be used by leaders and soldiers during the close fight, and to receive, transmit and execute mission requirements.*

4.3.7.1 Processing power and data storage must be sufficient to execute all required capabilities within mission time parameters. The processor, memory, and data storage capacities for the initial capability will evolve to support future growth as current and planned technology improvements are integrated into systems, and must be easily upgraded at depot level.

RATIONALE: *LW will be linked to other communication systems on the digitized battlefield. Therefore, the processing power and data storage must be sufficient to store, transfer, and display required functions in near real time to support the soldier's need for rapid situational assessment, decision-making, and effective communications.*

4.3.7.2 The LW leader System display and input device will be protected from mud, dirt, and sand so it can be used when exposed to the environment. Mud splatters, dirt, or wind-blown sand, dust or rain will not degrade computer performance. Minimum performance degradation from ice and snow on the computer keyboard or hand held display screen is required.

RATIONALE: *LW System must remain mission capable in all likely battlefield scenarios.*

4.3.7.3 The LW soldier will be able to power-up, set up, authorize, and initialize the LW System with the user's pre-set configuration within 3 minutes. The computer will incorporate a user validation system. Upon starting the computer, the computer will automatically check for attached peripheral devices and configure the system accordingly. The computer module will contain a setup program to lead the soldier through setup for each operational capability and to provide for ease of reconfiguration as necessary.

RATIONALE: *The time requirement is derived from experience with Global Positioning System (GPS) acquisition from turn-on; computer operating system boot time from turn-on – given commercial operating system software and the operational times associated with actions on the drop zone (land, assemble and check equipment, and prepare to move to assembly area).*

4.3.7.4 The LW System will be capable of determining time, position, and directional orientation, to include routes and way-points, and automatically send position information. LW Systems must be capable of determining the two dimensional location of the LW equipped soldier to an accuracy of up to 8 digits (10 meters). The information will be provided in the military grid reference system (MGRS), to National Imagery and Mapping Agency (NIMA) Datum's. A second, independent means of establishing position (Objective) and direction (Threshold) is required.

RATIONALE: *The precision navigation capability provides the soldier the capability of knowing his location at all times and automatically sending this location information to higher echelons at predetermined time intervals. A secondary navigation capability will measure the direction and distance a soldier travels when the position location signals are disrupted/degraded. This enables digital position reports to continue to flow with a reasonable level of accuracy and assists the soldier in remaining oriented. This capability, based on operational mode, enables the soldier to obtain the best solution during critical moments while conserving power, and at other times his need for rapid situational assessment, decision making, and effective command and control.*

4.3.7.5 The System will provide the soldier the means to manually update his position to correct System errors.

RATIONALE: *Selection of different navigation modes enables the soldier to select the best solution during critical moments while conserving power. While, at other times, his need for rapid situational assessment, decision-making, and effective command and control is enhanced.*

4.3.7.6 Message and Message Management: The threshold LW System will provide the following message set and messaging capabilities:

<u>System:</u>

- Selection of messages for review, storage, or deletion.
- Deletion will be based on type of message and precedence when storage limits are reached.
- Distinctive audio and visual warnings (when enabled) to alert receipt of high precedence and other priority information.
- Provide prompts and instructions to assist in filling out messages.
- Store electronic addresses of addressees, based on unit task organization, and automatically insert into messages as addressees are selected.
- Selectable, preset (less free text) precedence levels automatically entered.
- Options to - send immediately, store, or set for automatic-transmit at selected time.
- Acknowledges receipt automatically, when enabled by sender; read automatically, when requested/enabled by sender; and notify when addressees have returned received and read acknowledgements.
- Manual or automatic threat location data entry by sender or peripheral device.
- Simple text editor.

- Automatically tag transmitted messages with – Identity – Date – Time – Location of sender.

RATIONALE: *The above capabilities enhance System functionality, allow individual combatants to concentration on critical tasks in critical situations, and allow the system to execute functions for the combatant without distraction. Further, the above capabilities enhance System functionality for the acquisition, transfer, manipulation, and refinement of information that will be used by individual combatants in the execution of mission requirements. At times individual combatants will require complete concentration to accomplish a mission, and future planning tools or message formats that assist combatants will further enhance combat effectiveness. Additionally, individual combatants will be able to hear voice traffic over the integrated headset connected to the System. Audible warnings must be disabled, under certain conditions, and will be used in combination with visual warnings to increase the individual combatant's tactical awareness by alerts concerning high precedence (Immediate or Flash) messages, NBC and/or air alerts, computer data input or processing errors, or low battery conditions. These capabilities assist the individual combatant at critical times in the close fight. Finally, leaders have the ability, when time permits, to more easily prepare information for dissemination to subordinates.*

<u>Overlays</u>:

- Store and display on demand a grid, map, and digitized documents.
- Display standard Army symbols (Army Graphic Situation Display (GSD)) in all displays.
- Display Military Grid Reference System (MGRS) coordinates on any digitized map information (in computer storage) or using grid background.
- Overlays (e.g., friendly) will be available from one echelon below and two echelons above at platoon and lower.
- Overlays, with graphics, will be displayed to an accuracy of 100 meters from inputted digitized map.
- Given graphical map displays on displays, provide capability to draw simple graphics on display, store, or send with an accuracy of 100 meters from digitized map data on receiving displays.
- Display portions of digitized map data, which is stored.
- Options of selecting a map or grid display for echelon operational area.
- Displays will be available for one echelon down, and two echelons up.
- Display areas – 9km2 for squad, 25km2 for platoon and company.
- Map or grid size must be selectable.
- Zoom in or out, and scroll with input device.
- Store nine, NIMA 1:50,000 scale maps.
- Compressed Arc-Second Raster Chart (ARC) Digitized Raster Graphic, raster product, map data is initial requirement.

RATIONALE: *These capabilities enhance the acquisition, transfer, manipulation, and refinement of information that will be used by LWs to receive, refine, manipulate, and transmit map data and overlays in the execution of mission requirements.*

Data Store:

- Automatic update of unit data store from messages (e.g., Spot, SALUTE report, situation report (SITREP), Entity Data, etc.), overlays, and enemy information received within squad, platoon, company or battalion, and information from external sources from battalion or company level if provided.
- Includes information from one echelon down and two echelons up (e.g., squad to company; battalion to platoon).
- User over-ride capability is required.
- Incorporates and maintains friendly, enemy, target information, and displays selected portions on demand. The minimum essential data elements, and data store updating and sharing levels follow:
    - Friendly: Unit Identification – Date – Time – Location – Activity – Combat Power – Contact or No Contact – Updated by Specific Report (e.g., SITREP) – By Request, or – Automatically upon sending or receiving reports – Information (1 echelon down, 2 echelons up), or – Query to specified level.
    - Enemy: Location – Description – Activity (units, vehicles, and weapons) – Updated from next higher-level LW data store, or – From reports and overlays from next higher-level unit.
    - Target: Date – Time – Reported targets engaged.

RATIONALE: *These capabilities enhance the acquisition, transfer, manipulation, and refinement of information that will be used by individual combatants to execute mission requirements. These enhancements improve tactical awareness; help reduce the incidence of fratricide, and improve target information.*

4.3.7.7 The System will incorporate a capability for leaders to rapidly prepare orders and other detailed products. This capability may incorporate a compact Standard Typewriter Keyboard, Top Row Left, First 6 Letters (QWERTY) keyboard and external display or leverage available commercial off the shelf (COTS) technology to achieve the same end.

RATIONALE: *This capability allows leaders the ability to more easily prepare information, conduct rehearsals, and disseminate to subordinates.*

4.3.7.8 The System will be capable of:

- Denying unauthorized access to individual LW Systems.
- Purging stored and sensitive information: any information generated by battalion, which is unclassified but operationally sensitive (e.g., current mission information, e-mail, operational overlays, graphics).
- Zeroize: Encryption keys (e.g., GPS, SINCGARS, Multi-band Inter/Intra Team Radio (MBITR), WLAN).
- Purge and zeroize by soldier intervention, or remotely by the LW leader.

RATIONALE: *Provides safeguards and prevents information from falling into the hands of unintended or unauthorized users.*

4.3.7.9 A "help" program is required (Threshold). The simple "help" program, which activates upon soldier request or error condition recognized by the computer, will provide the soldier access to all available functions in a quick and easy manner (user friendly). To the extent possible, this help program will be provided via links to the appropriate information in the embedded LW Interactive Electronic Technical Manual (IETM) (Objective). The priority IETM to be included in the LW System is a LW Operators Manual and Preventative Maintenance Checks and Services Checklist.

RATIONALE: *These capabilities enhance System functionality, allow individual combatants to concentrate on critical tasks in critical situations, and provide assistance in the execution of combat tasks.*

4.3.8 Communications. LW System communications will transmit and receive secure and non-secure voice and digital information and allow for voice only communications if the LW computer fails. The LW System will provide Soldier and Leader radio systems for internal communications, and will interface with existing CNRs. Allows LW soldiers and leaders to communicate on internal nets and RTOs to communicate on legacy nets. It must provide for security, within the constraints of the Infantry force design, and employ low probability of intercept (LPI)/low probability of detection (LPD) techniques. The radiated power will be adjustable to suit the mission.

RATIONALE: *LW soldier and leader communications systems support greater dispersion and increase decentralized operations capability at small unit levels. Distances between soldiers will normally be small and the ability to use low power will allow for efficient use of the frequency spectrum, minimize detectability, and ensure that transmissions between soldiers will not interfere with transmissions outside of the squad. LW Leader radio systems must be compatible with the SINCGARS family of radios to interface with other communications assets on the battlefield.*

4.3.8.1 LW soldier/leader should not have to physically hold the computer and communications components to input and send short standard format data messages such as call for fire (CFF), SITREPs, contact reports, and medical evacuation (MEDEVAC) reports. Individual combatants must be able to send standard formatted messages that will be automatically transmitted to higher/lower echelons through use of a remote hand-held device. The device also allows the soldier/leader to select the report or message to be sent through use of the hands-free display.

RATIONALE: *Automatic transmission of the soldier's location allows the soldier to focus his attention on mission performance while enhancing the information of the higher headquarters. Hands free operation allows the soldier to be fully mission capable while transmitting and receiving information.*

4.3.8.2 It is required that the LW System used by LW leaders, FOs and RTOs have the capability to gateway to an external radio to transmit (voice only) to another net. The communications module for each of the squad members differ from the LW leader's radio in that the transmission and receipt of voice and data operates on only one net, with a 1.3 km range, based on smooth earth models. The operational frequency band selected must support intra-squad/section/team communications within the battalion area.

RATIONALE: *The ability to interface and control an external combat net radio, ensures extended range communications, and interface with other communications assets on the battlefield. LW communications support greater dispersion, and increase decentralized operations capability at small unit levels. Distances between soldiers will normally be small and the ability to use low power will allow for efficient use of the frequency spectrum, minimize detectability, and ensure that transmissions between soldiers will not interfere with transmissions outside of the squad.*

4.3.8.3 The computer and communications components will: incorporate the capability to send the soldier's location automatically at a predetermined maximum time interval and/or distance traveled since last report.

RATIONALE: *A precision navigation capability provides the soldier the capability of knowing his location at all times and automatically sending this location information to higher echelons at predetermined time intervals. This enables digital position reports to continue to flow with a reasonable level of accuracy and assists the soldier in remaining oriented, as well as populating the "common operating picture" within the Battalion. Selection of different navigation modes enables the soldier to select the best solution.*

4.3.8.4 The soldier will be able to hear voice traffic through a handset or headset connected to the LW System. The System will produce audible warnings over a speaker or through the handset or headset. Audible warnings must be able to be turned off and will be used in combination with visual warnings. The audible and visible (on the hands-free display) warnings will increase the soldier's situation awareness by alerting him that he has received a high precedence message (Immediate or Flash), an error in computer input, a low battery condition, computer error, NBC, or an air alert.

RATIONALE: *These capabilities enhance the acquisition, transfer, manipulation, and refinement of information that will be used to receive, transmit and execute mission requirements.*

4.3.8.5 LW communications will provide the LW soldier the ability to communicate with LW squad and platoon leaders while under cover and not in view of the enemy, such as while in a fighting position or other protected location.

RATIONALE: *This capability enhances the acquisition, transfer, manipulation, and refinement of information that will be used to receive, transmit and execute mission requirements, under all operational conditions and environments.*

4.3.8.6 Provide the LW soldier the capability to communicate with hands free and manual use of a headset (microphone and speaker).

RATIONALE: *Hands free operation allows the soldiers to be fully mission-capable while transmitting and receiving information.*

4.3.8.7 LW Leader compatible communications will allow leaders at the squad, platoon, company, and battalion, and other selected personnel to communicate. It will operate in all terrain environments and be capable of interfacing with the SINCGARS family of radios.

RATIONALE: *LW Leader compatible communications ranges will support greater dispersion, increase decentralized operations capability, and ensure communications with the SINCGARS family of radios.*

4.3.8.8 Range of LW leader compatible communications: 5 kilometers (km) based on smooth earth models.

RATIONALE: *LW Leader compatible communications ranges support greater dispersion and increase decentralized operations capability. The operational mission, concept of the operation, tactical and environmental conditions, and the threat environment drive distances between units. An operation in complex terrain and vegetation limits movement and encompasses a battlespace, which is approximately 5-7 kilometers. Communications range requirements, based on smooth earth models, reflect the reality of the environmental and terrain effects on communications components.*

4.4 Block I Non-KPP Requirement – Lethality.

4.4.1 Range finding and direction determining capability is needed for rapid and accurate determination of ranges to engage targets with direct and indirect fires, enables data to be sent via data transmission or voice. The laser capability will be eye-safe and have a range of 500 meters (Threshold)/ 1500 meters (Objective) under the standard definition of "7K visibility" conditions. The direction determination and laser capability will be accurate enough to provide grid coordinates of targets at maximum range that are accurate to $\pm$ 65 meters (circular error probability).

RATIONALE: *Provides the ability to accurately depict sector sketches, obstacle plans, and distances to engagement areas. The threshold laser ranging capability is based on the ranges of the weapons systems typically found within the Infantry Rifle Company. The grid coordinate accuracy of +65 meters is necessary to insure that the target location error required for a first round fire for effect from artillery systems is met.*

4.4.2 The DVS will be capable of capturing and transmitting still frame video images in daylight (Threshold). The DVS shall retain a sight reticle should the computer fail (Objective). Both the DVS and the thermal sight will allow the soldier to accurately

engage targets, with only his hands and arms exposed, by sighting with either the video image or the thermal image through the hands-free display.

RATIONALE: *A daylight video sight capability to produce video output which can be transmitted between LW leaders or through the LW leader's computer and communications components (e.g., external CNR), increases situational awareness and provides information for maneuver planning or other appropriate tactical actions. Although the thermal sight has both a day and night capability to capture video, the daytime image resolution is not as clear as that obtained from daylight video sight. The sight reticle in the daylight video sight will allow indirect viewing capability to accurately aim and fire the weapon sight (WS). This will allow LWs, without a thermal sight, to employ the indirect fire capability, which is a key survivability enhancement.*

4.4.3 The wiring harness must not impede the soldier's ability to move or perform mission tasks. The master cable should be capable of holding the weight of the major weapon(s) system (MWS) with all appended devices without damage to the cable. The connector end of the master cable must endure multiple connections without damage, and must not rattle when connections are not made.

RATIONALE: *The capability allows sensor information, mounted on the weapon, to be collected, processed and used by the System to enhance the combatant's ability to execute the close fight.*

4.4.4 The LW System will interface with the following weapons found in the Infantry platoon and company: MWS (M4 Carbine), MWS (M16A4), and M249 SAW (Threshold). The LW System will interface with the following weapons systems: M60 MG, M240B MG, Javelin Weapon System, including the Command Launch Unit (CLU), the missile, training devices, M24 Sniper Rifle with the Sniper Weapon Sight, and the Multipurpose Individual Munition/Short Range Assault Weapon (MPIM/SRAW), less the AT4 (Objective).

RATIONALE: *The capability allows sensor information, mounted on various weapons, to be collected, processed and used by the System to enhance the combatant's ability to execute the close fight. Based on weapons systems within the targeted unit fielding plan, these systems may be adjusted outside the context of this ORD.*

4.4.5 Soldiers equipped with LW must be able to fire the remaining individual weapons found at the small unit level without any degradation of performance. These weapons include the M60 MG, M240B MG, Javelin CLU, the AT4 Light Anti-tank Weapon with or without night sight, M24 Sniper Rifle with the Sniper Weapon Sight, and the MPIM/SRAW.

RATIONALE: *Operational necessity. The capability provides tactical flexibility in the close fight. This capability is a Manpower and Personnel Integration (MANPRINT) related consideration to ensure that the LW equipped combatant, if tactically necessary, can continue the fight.*

4.4.6 The LW could be required to use or come into contact with the following weapons; however, there is no current requirement for wiring harness interface. These weapons are the 9mm Pistol, 90mm Recoilless Rifle (Ranger units only), Stinger (Ranger units only), MK19 Grenade MG, Stingray, Bradley Fighting Vehicle System (BFVS), .50 Cal MG, and the Tube-launched Optically-tracked Wire-guided missile/ Tube-launched Optically-tracked Wire-guided missile Improved Target Acquisition System (TOW2/TOW ITAS).

RATIONALE: *Operational necessity. The capability provides tactical flexibility in the close fight. This capability is a MANPRINT related consideration to ensure that the LW equipped combatant, if tactically necessary, can continue the fight.*

4.5 Block I Non-KPP Requirement - Survivability.

4.5.1 Combat Identification: If Individual Combat Identification for the Dismounted Soldier (ICIDS) is available, LW's combat identification (CID) capabilities will satisfy the requirements contained in the ICIDS ORD. The least acceptable method of achieving this capability is layering the ICIDS solution (like adding a Multiple Integrated Laser Engagement System (MILES) Target Engagement System) over LW. This layering of ICIDS over LW, initially, will result in a weight penalty. This weight penalty will not be factored into LW threshold weight KPP, and is acceptable. LW will not prohibit ICIDS integration onto LW. Stand-alone ICIDS is required to be interoperable with the LW CID. If ICIDS is not available (i.e., has not been type classified by the initiation of the LW IOT&E), there is no CID requirement for the Block I LW system.

RATIONALE: *The ICIDS will be used to supplement existing target identification procedures, enhance situation awareness (SA), and help prevent the attack of friendly dismounted soldiers that may have been attacked under existing rules of engagement. It is not intended that ICIDS be used as the sole determinant to engage a target. The combination of existing target identification techniques and ICIDS will reduce fratricide and increase soldier survivability. The ICIDS is not a mission essential item in accordance with AR 70-75. The ability to identify dismounted ground maneuver forces and associated equipment is largely visual or aided visual. The range at which identification can be reliably accomplished by these means, relative to weapon range, is marginal in daylight and is deficient during periods of limited visibility. The ability of dismounted soldiers to identify one another as friendly is also marginal, especially at ranges over 300 meters and during periods of limited visibility. Currently, CID is limited to what is termed as "quick fix" devices. One device is called "BUDD-LITE" and its upgraded version "PHOENIX LIGHT." These devices are near infrared strobes and are used with night vision devices. They do not offer daytime CID or necessary security requirements. Only the visual target identification technique is used at present. It has a high error rate, especially at longer ranges and during periods of limited visibility. Because there is no dismounted CID system that possesses the security, reliability, and*

effectiveness levels cited in this document, the dismounted soldier's risk of being engaged and wounded or killed by highly lethal friendly weapons systems is steadily increasing.

4.5.2 LW must also be protected from bullet and fragmentation hits to the head. The LW helmet must not degrade currently expected survivability in close quarters engagements through the optimization of weight, fragmentation protection, and system configuration.

RATIONALE: *The greatest threat to the LW is fragmentation. The second greatest threat to the LW is bullets. Current Army helmet solution does not provide bullet protection. Protection equal or greater than currently available protection systems will minimize casualties from bullets or fragmentation.*

4.5.3 LW will incorporate Modular Body Armor (MBA) (Interceptor) as government furnished equipment.

RATIONALE: *The greatest threat to the LW is fragmentation. The second greatest threat to the LW is bullets. Protection equal to, or greater than currently available protection levels minimizes the risk of becoming a casualty from bullets or fragmentation. The modularity of MBA allows the commander to tailor the protective posture based upon threat, which facilitates more effective load management (i.e., weight), and lessens the impact on soldier mobility and provides the greatest enhancement to battle outcome.*

4.5.4 LW will incorporate visual, infrared, radio, and voice signature reduction capabilities available in current programs.

RATIONALE: *Operational necessity. Increased use of sensors (thermal, image intensification, lasers, target designators for precision munitions), and from threat directed energy weapon systems is expected. Protection of individual and unit combatants increases force effectiveness.*

4.5.5 Laser and Directed Energy Protection: Laser and ballistic eye protection is required and must be resistant to fogging. Degraded visual performance as a result of Level III laser protection is acceptable at initial fielding (Threshold). Improved laser and ballistic eye protection is desired. This may consist of integrating the future Military Eye Protection System into the LW System (Objective).

RATIONALE: *Increased use of lasers and target designators for precision munitions and from threat directed energy weapon systems is expected. Protection as required by Army standards against such weapon systems.*

4.5.6 Environmental (NBC) Protection: As a threshold, the LW soldier will have the lighter weight, increased NBC protection provided by chemical protective garments being developed under the Joint Services Lightweight Integrated Suit Technology (JSLIST) program and the M45 protective mask. The Joint Chemical Agent Detector (JCAD), weighing less than 1 lb will be furnished as GFE and fielded to

selected soldiers in accordance with the JCAD basis of issue plan. LW display devices will be compatible with Protective Masks. The LW System must operate for a minimum of 12 hours in a NBC environment without decontamination or hazardous degradation of critical protective capability. LW will interface to JCAD's enhanced reporting, reprogramming, and control capabilities (Objectives).

The LW System, less any disposable components, must be decontaminable to a level, which permits negligible risk (less than five-percent incapacitation) to unprotected personnel after an exposure period not to exceed 24 hours. NBC protection duration for the LW soldier will be contingent on the type of chemical protective garment utilized (Objective).

RATIONALE: *Current chemical and biological equipment reduces performance and degrades performance in the conduct of routine tasks. Tasks, which include extended operation, identification and engagement of targets, and night operations all become infinitely more difficult when conducted in MOPP 4. The JSLIST standard is 24 hours protection from chemical and biological agents, and provide the ability to conduct missions of up to 12 hours duration while encapsulated, based upon temperature, humidity, and work rate. Chemical and biological endurance as a limiting factor must be improved to enhance advanced dismounted capabilities. Improved lighter chemical protective garments must essentially eliminate heat stress and allow infantry soldiers to traverse various terrain types with increased speed, distance, and agility to perform missions of greater duration without degradation. The improved protective masks must allow soldiers to perform missions of greater duration with minimal degradation. A chemical detection capability is required to increase the soldier's threat situational awareness. The ability to decontaminate LW and equipment items, non-destructively, increases the combat durability of the system, in a chemical environment.*

4.5.7 The LW System shall survive High-Altitude Electromagnetic Pulse (HAEMP) to the degree specified in MIL-STD-2169B but not be required to work through the event. Recycling of power to restore operation is acceptable.

RATIONALE: *LW System must remain mission capable in all likely battlefield scenarios.*

4.5.8 LW will not be susceptible to computer network attack, and from being used to host such attacks on other elements of the ABCS.

RATIONALE: *This requirement will ensure that the LW System is less susceptible to information warfare methods, and cannot be used intentionally or unintentionally to infect communications or data networks of friendly forces.*

4.6 Block I Non-KPP Requirement – Mobility.

4.6.1 Load Carrying Equipment. The LW requires the integration of an ergonomically designed modular load system (MLS). The MLS will be provided as GFE .

RATIONALE: *A functionally integrated MLS, which allows the efficient carriage of the soldier's load, which includes water, is a must. Modularity is required to tailor the mission load. The soldier's load must be distributed to reduce stress and fatigue.*

4.6.2 An on-the-move-hydration capability integrating individual water purification is required. This hydration system must resist contamination when the soldier is exposed to a nuclear, biological, or chemical threat, and must interface with the M45 Protective Mask**.** The purification capability must purify at least 150 liters of water before system component replacement. This device must provide potable water through disinfecting/purifying non-potable water from local fresh water sources (Threshold). This capability will remove and/or destroy water-borne bacteria, biological and chemical agents to 99.999 percent, and remove and/or destroy most common pesticides, insecticides, and other organic materials from fresh and seawater sources (Objective).

RATIONALE: *This system will significantly increase soldier mobility and survivability in tactical situations. This system will drastically reduce the soldier and unit's water 'load' requirement (8 pounds per gallon of water); minimizing the logistical footprint for conducting water resupply in a tactical environment. The lack of potable water in a tactical environment, where resupply is limited, may require soldiers to drink from available sources, risking disease or exposure to hazardous pollutants.*

4.7 Block I Non-KPP Requirement – Sustainability.

4.7.1 The LW will be sustained by standard Army logistic procedures (Objective). Because LW is a revolutionary change in the equipping of the infantry organizations, some additional infrastructure may be required. LW will minimize added infrastructure and provide a management means to reduce this infrastructure as technology matures (Threshold). LW will provide the soldier with a report form on the system for timely re-supply and casualty evacuation reporting with greater accuracy.

RATIONALE: *LW's support concept includes support from both military and contract personnel using the most cost and operationally effective means available during peacetime with acceptable risk when in transition to wartime, and shall be sufficient to support wartime Operational Tempo (OPTEMPO) and conditions. Standard report format reporting capabilities enhance the acquisition, transfer, manipulation, and refinement of information that is used in mission execution.*

4.7.2 Non-standard power configurations will be minimized and utilized by exception (Threshold). Standard Army battery configuration(s) will be used (Objective).

RATIONALE: *The fielding of new equipment for the individual soldier has been done with insufficient consideration for the cumulative increase to the weight carried by*

troops. This unchecked weight growth has been due in part to the lack of centralized soldier system management. In defining and developing the first integrated system, the incorporation of new technologies provides capabilities that were not available before. However, these technologies (i.e., electronic components) require power to operate. Power, in the near term, means batteries. Use of standard batteries, if possible, reduces program costs and lessens the logistical impact on fighting organizations. However, the need for power, and how that power is provided, will be considered as critical as weight. Emphasis on new power sources, and weight reduction will be closely linked in system design evolutions.

4.8 Block II KPPs. Block II will incrementally improve the baseline system through a P3I process as well as provide requirements for designing and fielding LW as an integral component of the Interim Force. A primary focus of Block II will be to implement Army and DoD approved hardware, software, and policy revisions that support the interoperability of mixed security systems on the battlefield. The key requirements aspect of Block II is that threshold system evolution (P3I) is conducted in parallel with interim force initiatives. This document specifies KPPs for a Block II LW system for the dismounted soldier. It is expected that a P3I effort will focus on achieving these KPPs as well as correcting deficiencies identified in the LW IOT&E. Interim force KPPs remain to be determined but will clearly focus on dismounted/mounted force interoperability as well as a vehicle-based LW recharging capability.

Key Performance Parameter	Block II Threshold and Objective
KPP 1: Situational Awareness (Threshold System Upgrade)	Provide ABCS interoperability with the light force digital TOC.
KPP 2: Situational Awareness (IBCT)	Provide data download (situational awareness, orders, and overlay information) from the interim force vehicles to the LW System. (Threshold).
KPP 3: Situational Awareness (IBCT)	Provide the capability for the LW System on one ICV to communicate with LW Systems on other vehicles (Threshold).
KPP 4: Mobility (Threshold System Upgrade)	Decrease the gross LW System weight by 10 % (83.32 lbs.) (Threshold) / 20percent (74.1 lbs.) (Objective).
KPP 5: Sustainability (Threshold System Upgrade)	Provide a system power source and integrate system power management to achieve a system battery life of 24 Mission Hours with a disposable power source (Threshold) / 48 mission hours (Objective).
KPP 6: Sustainability (IBCT)	Provide an on-board power recharging capability in the interim force vehicle for the LW equipped soldier.

Table 4-5. Block II KPPs .

4.8.1 KPP 1 Situational Awareness (Threshold System Upgrade). Provide ABCS interoperability with commensurate capability of the interim force and with light forces digital Tactical Operations Centers. This KPP is predicated on the assumption that administrative barriers to communications have been resolved. Specific critical information exchange requirements will be published and inserted into Table 4-6 once the user community has developed and approved the LW/IBCT operational concept.

RATIONALE: *Implementation of this requirement allows selected information to interact between interim force vehicles and the dismounted soldier as well as share critical information and orders with digitally equipped light force command and control assets.*

4.8.2 KPP 2 Situational Awareness (IBCT). Provide data download (situational awareness, orders, and overlay information) from interim force vehicles to the LW System. (Threshold).

RATIONALE: *The LW System as employed in the IBCT unit formation and operational architecture must have the correct level of operational integration with their vehicle system. This ensures leaders and other rifle and weapon squad soldiers understand the tactical situation upon vehicle exit and do not lose momentum while trying to orient to the situation and terrain. This capability also will enhance synchronization of fire and maneuver between dismounted and mounted elements. While conducting operations away from the vehicle system, leaders can maintain continuous communications with these assets.*

4.8.3 KPP 3 Situational Awareness (IBCT). Provide the capability for the LW System on one ICV to communicate with LW Systems on other vehicles (Threshold).

RATIONALE: *The LW System as employed in the IBCT unit formation and operational architecture must have the correct level of operational integration with other vehicle systems. To effectively develop the situation while moving mounted (in or out of contact), key leaders must be able to communicate and update the tactical plan. This will enable maximum combat effectiveness upon dismount with the ability to rapidly transition to dismounted infantry tasks.*

4.8.4 KPP 4 Mobility (Threshold System Upgrade). Decrease the gross LW System weight by 10 percent (83.32 lbs.) (Threshold) / 20 percent (74.1 lbs.) (Objective).

RATIONALE: *For every ten percent load reduction, soldiers will increase squad/team optempo by approximately 1 mile in an eight-hour period resulting in a capability to reach objectives in a shorter period of time and improve small unit operational effectiveness. In Block I the focus is weight management, given that LW initially in an integration of equipment that currently exists or will soon be fielded to infantry units. Block II challenges the weight reduction effort in this time frame by requiring significantly reduced system weights. The intent is to catalyze innovative materiel solutions or possible infantry force structure designs to significantly advance this critical*

aspect of soldier effectiveness.. It is not a requirement to achieve this KPP at initial fielding of Block II but rather to focus funding during the time frame to achieve this capability by the end of the Block.

4.8.5 KPP 5 Sustainability (Power). Threshold System upgrade provides a power source and integrates system power management to achieve an operational capability battery life of 24 Mission Hours with a Block I disposable power source (Threshold) / 48 mission hours (Objective). A combination of chargeable and rechargeable batteries will be introduced in Block II.

RATIONALE: *Initial theatre entry goal is for the unit to be self sustaining for 72 hours. Typical logistical resupply occurs every 24 hours. To conduct 24 hour operations, a Block I equipped soldier will have to carry two batteries weighing a total of four pounds. In Block II an "alternative" to battery solution is anticipated. The Interim Armored Vehicle includes a P3I for a battery recharging capability. The mission life/weight intent is to establish the need for only one battery per 24 hours while also dropping one pound on the overall soldier system load. This approach enhances mobility as well as sustainability.*

4.8.6 KPP 6 Sustainability (IBCT). Provide an on-board power recharging capability in the interim force vehicle for the LW equipped soldier.

RATIONALE: *The structure of an IBCT organization provides the capability to virtually eliminate the need for higher cost disposable batteries. An IBCT organization with LW embedded into its structure must implement on-vehicle recharging for all systems that will transport a soldier assigned a LW system. Unit operational tempo costs associated with a disposable battery sustainment concept is dramatically minimized while no additional support structure is required to implement a rechargeable LW sustainment concept.*

4.9 Block II Non-KPP Requirement - System Performance. The following are the system characteristics and capabilities required by a LW materiel solution.

4.9.1 LW System, with all components functioning, will be audibly non-detectable (except when weapons are fired) at 5 meters (Threshold). The LW System shall be audibly non-detectable while in silent watch mode at a distance of 1 meter (Objective).

RATIONALE: *This requirement was initially based on the requirement for the TWS program that stated the TWS would not emit light and noise that is detectable in any direction at a distance of beyond 5 meters by an unaided soldier.*

4.9.2 Special Forces Requirements.

4.9.2.1 Incorporate Special Forces unique command and control interfaces with the ABCS components (e.g., FBCB2), as defined by the proponent.

RATIONALE: *Supports the ability of SOF, using LW, to inter-operate with conventional LW units, and other digitized forces.*

4.9.2.2 Incorporate interfaces appropriate for unmanned aerial vehicles (UAVs) or satellites as defined by the proponent.

RATIONALE: *Supports the ability of SOF, using LW, to inter-operate with conventional LW units, and other digitized forces.*

4.9.2.3 The LW System will be configurable to accept Special Forces Night Vision Equipment.

RATIONALE: *Supports the ability of SOF, using LW, to integrate SOF unique requirements.*

4.9.2.4 WS modifications are required to apply SOF Weapons Modification (SOPMOD) Kits.

RATIONALE: *Supports the ability of SOF, using LW, to integrate SOF unique requirements.*

4.9.3 System Voice Management. The intent of system voice management is to leverage off the shelf technology to provide two primary functions. The first function is to command screens and select subordinate screen information choices by using voice command. Voice commands would include all commands required to activate a function, fill out necessary information fields and send the message. The second function is to be able to translate speech into free text message where appropriate in existing messages. A means to easily switch from voice to manual input is required. The intent of this threshold capability is to minimize leader requirement to manually input information fields by using a computer interface (mouse) device or other external text input devices. This threshold capability will integrate into existing LW equipment so as not to require unique microphones or other special equipment. Initial system voice management capability is oriented towards alleviating the leader's burden while planning and also while on the move and is not required to function effectively in a continuous high noise clutter environment. An objective requirement will evolve this capability to become effective in close and sustained combat environments.

RATIONALE: *Leaders are more effective when their attention is not diverted to the mechanics of message input. A threshold capability is for certain leaders to carry a hand held display and keyboard for more detailed message management. Other LW equipped soldiers must manipulate a mouse to utilize messaging. While acceptable for a threshold capability, these solutions may reduce OPTEMPO as the leaders focus is diverted or the unit may have to halt while the leader uses external input devices. The initial capability*

of integrated COTS type voice recognition capability will provide leaders a means to execute detailed messages while not in contact but also demanding a high OPTEMPO (approach march, etc). Once mature, the successful evolution of voice command capability may eliminate hardware components, thereby reducing the soldier's load. Block II assumes that effective voice control in a high clutter (sustained combat) environment is inherently more difficult and will require more time to mature. While the desired end state is voice management in all environmental conditions, this initial capability will enable effective and rapid message management during many operational scenarios short of direct, sustained combat, thereby increasing unit OPTEMPO and leader capability to synchronize combat power.

4.9.4 (Objective) Engineer "Sappers" Requirements.

4.9.4.1 Embed Standoff Mine Detection System (STAMIDS) within the engineer modules of LW.

RATIONALE: *Facilitates advanced detection and allows for immediate alternate route planning for LW units.*

4.9.4.2 Embed the Demolition Planning Software (DPS), with the following enhancements:

4.9.4.3 Incorporate FM 5-250, Explosives and Demolitions.

RATIONALE: *Provides information to facilitate removal of obstacles for LW units.*

4.9.4.4 Include the following engineer specific DA Forms (written and formatted in Joint Variable Message Format (JVMF) form): DA 2203 R, Demolition Reconnaissance Report; STANAG 2123 (ENGR), Edition 2, Obstacle Folder.

RATIONALE: *Provides digital means of transmitting engineer information rapidly to high headquarters.*

4.9.4.5 Forms should be accessible, and Bill of Materials (BOM) for a mission should be calculated automatically. Forms should be capable of being sent to next higher echelon using organic communication systems (i.e., the engineer module of LW).

RATIONALE: *Provides LW units an expedited procedure, to assist in the timely submission of BOMs.*

4.9.4.6 Embed the Reconnaissance System with the following enhancements:

RATIONALE: *Provides the LW soldier the capabilities to conduct forward reconnaissance and make timely mission decisions.*

4.9.4.7 Incorporate Engineer Field Manuals: FM 5-34, Engineer Field Data, and FM 20-32 Mine/Countermine Operations.

RATIONALE: *Provides LW supported units digital reference material for engineers to assist with mine/countermine operations.*

4.9.4.8 Incorporate the following Engineer specific DA Forms. The forms will be written and formatted JVMF: DA 1248, Road Reconnaissance Report; DA 1249, Bridge Reconnaissance Report; DA 1711-R, Engineer Reconnaissance Report; and DA 1355, Minefield – Record.

RATIONALE: *Provides LW supported units rapid transmission of critical reports that affect a unit's movement to the objective.*

4.9.4.9 Continue soldier as a system weight reduction and operational effectiveness improvement initiatives by seeking to reduce the weight of functions currently carried by the soldier, consolidating functions, or consolidating items to achieve increase overall soldier capability.

RATIONALE: *The materiel developer is tasked to pursue and ultimately procure items that the soldier wears, carries or consumes that provide enhanced operational benefit. During Block II, the materiel developer is tasked to seek methods to improve soldier performance by maximizing technology innovations. Solutions could be simple weight reduction initiatives, function consolidation or new systems / soldier designs that increase battlefield effectiveness. As a plan is devised and materiel solutions offered, the combat developer will provide an analysis of the potential value of new and innovative solutions. The overarching intent of this requirement is to not initially constrain the materiel developer from pursuing promising initiatives because of requirements document oversight. Examples of technologies that could be pursued under this requirement could be advanced lasers, consolidated optics, lighter weight thermal sights or battlefield uniforms that reduce multiple items of clothing for unique purposes.*

4.10 Block II Non-KPP Requirement – Situational Awareness.

4.10.1 Display: Color Hands-free Display.

RATIONALE: *Hands free displays provide the soldier a visual interface between himself and his system. Color will enhance the LW's viewing and interpretation of visual information, and increase effectiveness in combat operations.*

4.10.2 Information Processing.

4.10.2.1 A multi-address capability to up to four addresses. For example, a CFF message would be automatically addressed and sent to the fire support

team (FIST), company commander, and battalion fire support element and/or fire support officer (FSO).

RATIONALE: *Provides LW units a way to rapidly distribute critical information to designated individuals.*

4.10.2.2 The leader will have the option of having the computer audibly remind him to send a situation report at a preset time. The leader will have the option of re-transmitting the situation report as a "no change."

RATIONALE: *Provides the LW leader options to make reports that often have no change which saves time and effort.*

4.10.3 Communications.

4.10.3.1 The LW System will provide Two-way Conversational Mode of communications. LW communications conversational-mode communication is required for intra-squad/section/team communications to allow two-way voice communication similar to telephone communications and provide for simultaneous voice and data communications.

RATIONALE: *This capability facilitates the elimination of the need to continually "push-to-talk" during voice communications is contact.*

4.10.3.2 The system shall be designed to interface with the SINCGARS frequency hopping radio and planned improvements to the SINCGARS family of radios.

RATIONALE: *Crucial linkage is the path to FBCB2 for LW soldiers and leaders.*

4.10.3.3 Data and video capture transmission time for both the squad and higher levels will be minimized to the extent possible, but must be less than or equal that of current combat net radios.

RATIONALE: *Operational necessity. Reduces communication time, and reduces the potential for interference in transmission, or possible interception by threat systems, and enhances the acquisition, transfer, manipulation, and refinement of tactical information necessary for mission execution within the constraints of performance of combat net radios.*

4.10.3.4 It is required that the LW System used by LW leaders, FO's and RTO's have the capability to gateway to an external radio to permit data or digitized still frame video to be transmitted to another net.

RATIONALE: *Provides LW leaders the ability to send video images to supporting agencies to enhance situation awareness.*

4.10.3.5 Data switching between nets will occur as required, and re-transmitting the data fast enough to make it transparent to the user.

RATIONALE: *Gives LW leaders the ability to monitor the higher level tactical network to increase situation awareness.*

4.10.3.6 The LW System must have the ability to network to facilitate interactive collective training, and troop leading procedures.

RATIONALE: *Compatibility provides seamless information transfer across multiple networks to LW units.*

4.10.3.7 Utilizing LW communications, the fire support elements at company and platoon level (platoon FO w/RTO, FSO w/RTO, FSNCO w/RTO) must, at a minimum, be able to communicate on the supported maneuver unit command net - voice and data. This is provided by legacy communications.

RATIONALE: *Provides LW user a valuable tool to rehearse operations and train leaders.*

4.10.3.8 (Objective) The LW System shall integrate applicable systems of the Joint Tactical Radio equipment family as they become available.

RATIONALE: *Critical interface to future systems allows LW to play a major role in Objective Force operations for LW units.*

4.10.4 C4I/Standardization, Interoperability, and Commonality. It is required that the fire support LW establish interoperability with mission software utilized by soldiers typically task organized to the infantry force design at the company and below. Memorandums of agreement will be established with the respective combat developer proponent to determine the level of interoperability required and source of development and integration support.

RATIONALE: *Special mission soldiers such as engineers, field artillery, etc., are attached to the infantry company team and perform primary mission functions through specialized software. The Block I system will provide these soldiers with situational awareness previously not available but will not provide the ability to transfer data or manage and control functions between systems. Removing this "firewall" will enhance small unit interoperability while also providing combat developers greater options to reduce the soldier's load for attached soldiers.*

4.11 Block II Non-KPP Requirement – Lethality.

4.11.1 DVS. The DVS shall retain a sight reticle should the computer fail.

RATIONALE: *The sight reticle in the daylight video sight will allow indirect viewing capability to accurately aim and fire the weapon. In Block I the DVS reticle is not available if the computer is not operational. This capability ensures that the DVS reticle is available regardless of the status of the computer.*

4.11.2 The LW System will interface with the following weapons systems: M60 MG, M240B MG, Javelin Weapon System, including the CLU, the missile, training devices, M24 Sniper Rifle with the Sniper Weapon Sight, and the MPIM/SRAW, less the AT4.

RATIONALE: *Operational necessity. The capability provides tactical flexibility in the close fight. This capability is a MANPRINT related consideration to ensure that the LW equipped combatant, if tactically necessary, can continue the fight.*

4.12 Block II Non-KPP Requirement – Survivability:

4.12.1 LW will support Combat ID functionality by integrating the ICIDS capability.

RATIONALE: *The ICIDS will be used to supplement existing target identification procedures, enhance SA, and help prevent the attack of friendly dismounted Soldiers which may have been attacked under existing rules of engagement. The ICIDS is not intended as the sole determinant to engage a target. The combination of existing target identification techniques and ICIDS will reduce fratricide and increase Soldier survivability.*

4.12.2 LW must incorporate a laser/directed energy detection device that will detect coherent laser energy and alert the individual soldier to the impending threat (Objective).

RATIONALE: *It is expected that there will be increased use of lasers, and target designators for precision munitions and from threat directed energy weapon systems. Warnings provided by this capability will increase the LW's survivability.*

4.12.3 The LW system, less any disposable components, must be decontaminable to a level, which permits negligible risk (less than five-percent incapacitation) to unprotected personnel after an exposure period not to exceed 24 hours. NBC protection duration for the LW soldier will be contingent on the type of chemical protective garment utilized.

RATIONALE: *The JSLIST standard is 24 hours protection from chemical and biological agents, and provide the ability to conduct missions of up to 12 hours duration while encapsulated, based upon temperature, humidity, and work rate. Chemical and biological endurance as a limiting factor must be improved to enhance advanced dismounted capabilities. The ability to decontaminate LW and equipment items, non-destructively, increases the combat durability of the system, in a chemical environment.*

4.12.4 Improved laser and ballistic eye protection. This may consist of integrating the future Military Eye Protection System into the LW system.

RATIONALE: *It is expected that there will be Increased use of lasers, and target designators for precision munitions and from threat directed energy weapon systems. Operational necessity and Army standards require protection.*

4.12.4 All powered and non-powered optics must deny detection by threat systems employing optical augmentation (OA). All powered and/or non-powered optics, sights and devices with optical lenses, when employed and engaged by lasers capable of damaging a soldier's eyes, will protect the soldier's eyes from damage, and will result in no damage to the optical devices.

RATIONALE: *Increased use of optical augmentation technologies against friendly optics by threat systems is expected. Protection is required by operational necessity.*

4.12.5 An interface/integration with/of a chemical agent detector is required.

RATIONALE: *Warnings provided by this capability increases LW equipped units survivability, and allows for change in action necessary to maintain combat operational TEMPO.*

4.12.6 LW System will be compatible with the developmental Joint Service General Protective Mask (JSGPM).

RATIONALE: *Enhances survivability and mobility of LW soldiers and leaders.*

4.12.7 (Objective) The LW will integrate a Warfighter Physiological Status Monitoring (WPSM) capability. The WPSM is being designed to assist the Infantry soldier combat capabilities to achieve overmatch in the Close Battle across the full spectrum of military operations to achieve decisive results in all operating environments, weather conditions, and terrain. The WSPM system must allow for the collection and exchange of data input of data into the Theater Medical Information Program (TMIP). The WPSM will be an integrated suite of sensors, and will provide remote triage including life status monitor, and other necessary physiological and environmental parameters. The data from the sensor suite will be processed according to algorithms to produce meaningful information for commanders and combat medics. The combat medic will have the ability to interface with senior medical personnel at the Battalion Aid Station to assist in the treatment of casualties.

RATIONALE: *The WPSM capabilities provide enhanced force effectiveness for commanders, and Combat Medics. The capability will assist in the assessment of a commanders unit, and the decision making process. The goal is to decrease the number of casualties and increase force effectiveness.*

4.13 Block II Non-KPP Requirement – Mobility:

4.13.1: An on-the-move-hydration capability is required. This hydration system must resist contamination when the soldier is exposed to a nuclear, biological, or chemical threat, and must interface with the protective mask (i.e., JSGPM).

RATIONALE: *Allows the soldier to drink on the move and accelerate movement to objectives.*

4.14 Block II Non-KPP Requirement – Sustainability:

4.14.1 The LW contract furnished equipment (CFE) integrated into the leader ensemble shall have a probability of at least .93 (.94 Objective) of operating for 12 hours w/o incurring a MAF. The LW CFE integrated into the soldier ensemble shall have a probability of at least .94 (.95 Objective) of operating for 12 hours w/o incurring a MAF

RATIONALE: *This requirement indicates a 15 percent increase to the LW leader's ensemble and 25 percent increase for Soldier's ensemble with respect to the Block I requirement, and will enable a higher level of system reliability and readiness to be obtained. The higher level of CFE reliability will reduce the number of MAFs encountered by approximately 15-25 percent thereby reducing demands on the logistics support system.*

4.14.2 On-Line fault isolation shall allow the operator to identify a single fault to an ambiguity group of no more than two operator replaceable (configurable) items with at least 80 percent accuracy without user action to modify the system configuration. On-Line fault isolation shall allow the operator to identify a single fault to an ambiguity group of no more than two operator replaceable (configurable) items with at least 95 percent accuracy when used with guided (operator level) systems reconfiguration directions.

RATIONALE: *To ensure that the LW systems can execute assigned functions without the risk of mission failure and threat to life because of equipment malfunction. Retains operational tempo by identifying critical functional degradation, for which action can be taken to overcome if known, and minimizing maintenance and supply burdens of miss-diagnosed failures.*

4.14.3 The mean time to repair (MTTR) LW contractor furnished equipment (CFE) malfunctions/failures will not exceed .68 hours for dedicated TOE maintenance personnel.

RATIONALE: *To preclude the need for excessive manpower support by constraining the burden placed on dedicated TOE maintenance personnel to a level established through consideration and analysis of MTTR requirements for baseline infantry equipment/systems. Objective Requirement is to minimize burden placed on dedicated*

TOE maintenance personnel through reduction of repair time to the technical limit projected by the materiel developer. It is expected that the Block I Objective requirement should be improved upon during the Block II timeframe.

4.15 Block III. Block III provides the requirements to evolve towards an "Objective Force Warrior (OFW)" as well as provide a means to continuously evolve the threshold system. Requirements identified in this ORD focus on desired threshold system capability evolution. Block III requirements will be defined at the proper point in LW program progression.

4.16 Information Exchange Requirements: A capability for the timely and accurate exchange of information between sender and recipient is required. The threshold system will incorporate the information exchange capability defined below. Objective capability or capability aligned with subsequent blocks will be defined based on refining the information exchange requirements of LW in the specific unit type.

4.16.1 The below high level operational concept graphic presents a top-level view of the system's interoperability requirements with other current and future systems. The Block I LW communications structure limits communications interoperability to within similarly equipped LW soldiers. Based on soldier access to all information in the LW system and the reality that not all soldiers have the requisite security clearance, the LW communications architecture must remain unclassified for platoon sergeant and below. Platoon leaders and above have communications (long range secure) and appropiate clearances. It is assumed that by Block II a combination of materiel solutions and policy resolution will enable interoperability with higher command and control system architectures as well as vehicle systems operating in a SECRET communications architecture. This is a flexible architecture. Information access is dependent on your position within the unit i.e. rifleman, platoon sergeant or commander.

LW PHASED APPROACH FOR TI SYSTEM INTERFACE (Operational View)

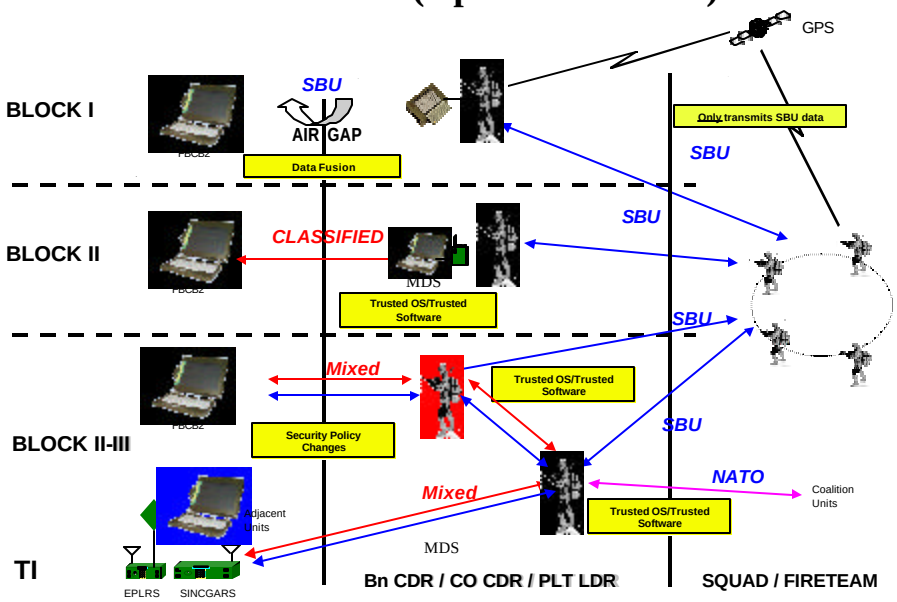

Figure 4-1. OV-1

4.16.2 The approach for LW interoperability with the Army Battle Command System (ABCS) will follow the three phases. Although interface/interoperability between LW and ABCS is a LW Block II requirement, it will not be required in Block I due to an Army-wide problem with the lack of definition of interface between cleared and un-cleared user communities, i.e. the ABCS at Secret High, and the LW system at Sensitive but Unclassified (SBU). Seamless electronic interface between generally uncleared soldiers using the LW weapons system and the ABCS command and control system is not possible under current policy guidelines. Key leadership elements of the LW community will retain legacy C2 capabilities through the use of existing secure voice equipment.

4.16.3 Implementation of Phase II, limited interoperability, will be achieved through adoption of Army approved tactical guards and gateways, as defined by ongoing actions of the CECOM Security Architecture Working Group, the DISC4, and the Secret and Below Interoperability (SABI) committee of the NSA.

4.16.4 Full interoperability will be achieved through the implementation of LW-suitable trusted computer operating systems and multi-algorithm encryption hardware, coupled with revisions in current security policy and procedures that are supportive of tactical operations in mixed security environment.

4.16.5 System View The Block I system established digital interoperability within the LW equipped architecture. Secure voice communications is provided by

currently fielded combat net radios. Block II will establish interoperability with ABCS systems based on removal of previously states security issues. It is expected that the LW equipped system will interface with the FBCB2 system on other vehicles or in command centers as well as systems currently comprising the operational design of the light force and IBCT battalion TOC.

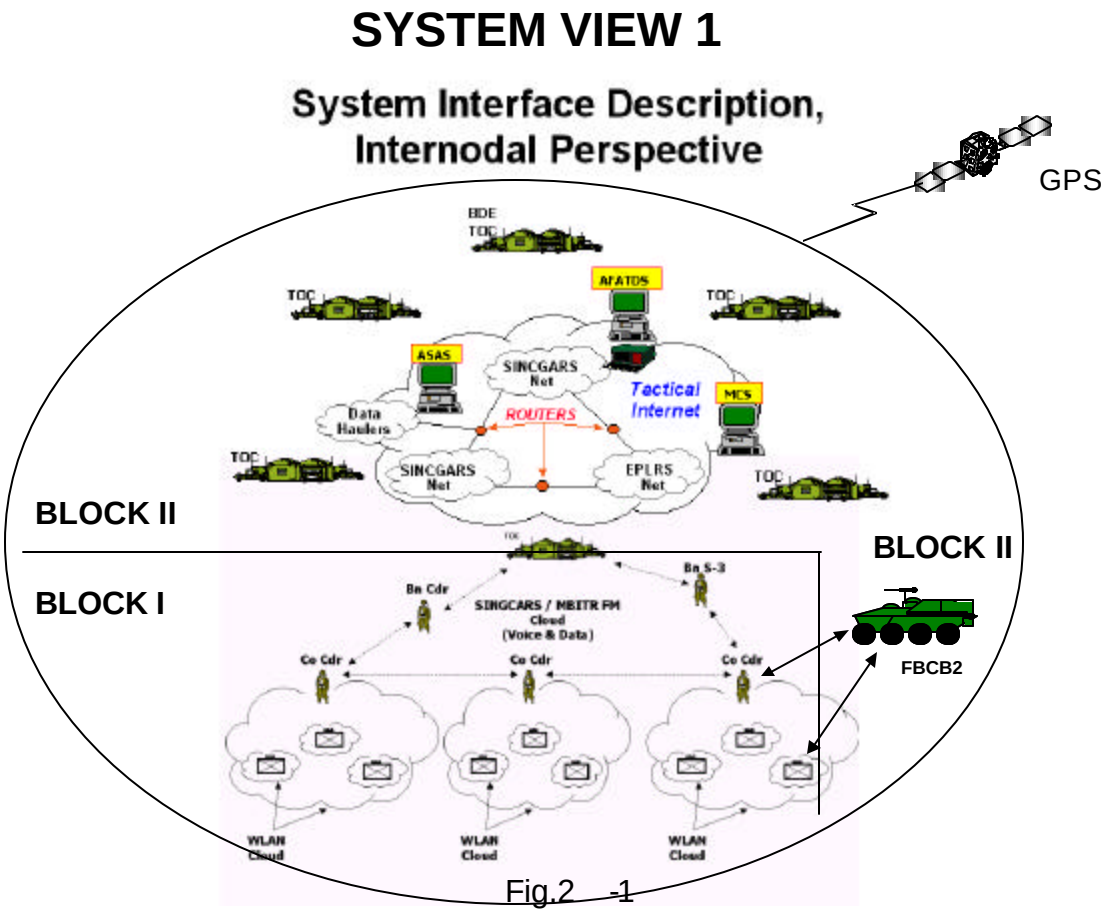

Figure 4-2. System View

Table 4-6. Critical Intra-Army Information Exchange Requirements

Rationale: AUTL #	Event / Action	Information Characterization	Sending Node	Receiving Node	Critical	Format	Timeliness BLK I	Timeliness BLK II	Timeliness BLK III	Classification	Remarks
ATM 1.0 ATM 2.0 ATM 3.0 ATM 5.0 ART 1.2 ART 2.2 ART 2.5 ART 3.2 ART 5.3 ART 6.1 ART 6.2 ART 6.5 ART 7.2 ART 7.3 ART 7.4 ART 7.6	New or Updated Data	Position Report	Soldier	Tm Ldr, Plt Sgt, Plt Ldr	Y	Data	NA	30 sec	30 sec	U	Enables synchronization of individual/team fire and maneuver while avoiding potential fratricide
	New or Updated Data	Position Report	Plt Ldr	Co Cdr	Y	Data	NA	30 sec	30 sec	U	Enables synchronization of platoon level fire and maneuver while avoiding potential fratricide
	New or Updated Data	Position Report	Co Cdr	Bn TOC	Y	Data	NA	30 sec	30 sec	U	Enables synchronization of company level fire and maneuver while avoiding potential fratricide
	New or Updated Data	Spot / SALUTE Report	Soldier	Tm Ldr, Plt Sgt, Plt Ldr	Y	Data	NA	30 sec	30 sec	U	Enables the ability to mass soldier and team effects at the time and place of choosing
	New or Updated Data	Spot / SALUTE Report	Plt Ldr	Co Cdr	Y	Data	NA	30 sec	30 sec	U	Enables the ability to mass platoon effects at the time and place of choosing
	New or Updated Data	Spot / SALUTE Report	Co Cdr	Bn TOC	Y	Data	NA	30 sec	30 sec	U	Enables the ability to mass company effects at the time and place of choosing
	Orders Publication, Situation Change	Field Orders (OPORD, FRAGO, WARNO)	Bn TOC	Cdr	Y	Data	NA	15 min	15 min	S	Enables combined arms to disseminate information quickly. This allows forces to maintain freedom of action (tempo) through combined arms maneuver.
	Orders Publication, Situation Change	Field Orders (OPORD, FRAGO, WARNO)	Cdr	Plt Ldr	Y	Data	NA	15 min	15 min	S	Enables combined arms to disseminate information quickly. This allows forces to maintain freedom of action (tempo) through combined arms maneuver.
	Orders Publication, Situation Change	Field Orders (OPORD, FRAGO, WARNO)	Plt Ldr	Plt Sgt; Sqd Ldr	Y	Data	NA	15 min	15 min	S	Enables Plt Ldr to disseminate information quickly. This allows forces to maintain freedom of action (tempo) through air-ground combined arms maneuver.
	Orders Publication, Situation Change	Field Orders (OPORD, FRAGO, WARNO)	Sqd Ldr	Tm Ldr; Soldier	Y	Data	NA	15 min	15 min	S	Enables Sqd Ldr to disseminate information quickly. This allows forces to maintain freedom of action (tempo) through combined arms maneuver.
	New or Updated Data	Overlay	Bn TOC	Co Cdr	Y	Data	NA	30 sec	15 sec	U	Enables combined arms to disseminate operational graphics quickly. This allows forces the ability to view in real time, graphic control measures. This reduces potential fratricides when correlating location of units and these control measures.
	New or Updated Data	Overlay	Co Cdr	Plt Ldr	Y	Data	NA	30 sec	15 sec	U	Enables Plt Ldr to disseminate operational graphics quickly. This allows forces the ability to view in real time, graphic control measures. This reduces potential fratricides when correlating location of units and these control measures.
	Execute Tactical Operations	CFF	Plt Ldr/FO	Co FIST/Co Cdr	Y	Data	NA	30 sec	15 sec	U	Enables leaders the ability to control/synchronize fires in a timely manner. This reduces potential fratricides when correlating location of units and indirect fire targets.

Table 4-6. Critical Intra-Army Information Exchange Requirements (continued)

Rationale: AUTL #	Event / Action	Information Characterization	Sending Node	Receiving Node	Critical	Format	Timeliness BLK I	Timeliness BLK II	Timeliness BLK III	Classification	Remarks
	Execute Tactical Operations	CFF	Co FIST/Co Cdr	Bde/Bn FSE	Y	Data	NA	30 sec	15 sec	U	Enables leaders the ability to control/synchronize fires in a timely manner. This reduces potential fratricides when correlating location of units and indirect fire targets.
	New or Updated Data	Free Text	Plt Ldr/FO	Co Cdr/Co FIST	Y	Data	NA	30 sec	15 sec	U	Enables leaders the ability to build and sustain combat power by passing needed information that is not in standard reports.
	New or Updated Data	Free Text	Co Cdr/Plt FIST	Bn TOC	Y	Data	NA	30 sec	15 sec	U	Enables leaders the ability to build and sustain combat power by passing needed information that is not in standard reports.

Table 4-7. Non-Critical Intra-Army Information Exchange Requirements

Rationale: AUTL #	Event / Action	Information Characterization	Sending Node	Receiving Node	Critical	Format	Timeliness BLK I	Timeliness BLK II	Timeliness BLK III	Classification	Remarks
	New or Updated Data	Range Card	MG	Wpn Sqd Ldr	Y	Data	NA	30 sec	15 sec	U	Enables machine gunner to pass Range Card data to Wpns Sqd Ldr to develop his fire support plan.
ATM 1.0 ATM 2.0 ATM 3.0 ATM 5.0	New or Updated Data	Range Card	Wpn Sqd Ldr	Plt Ldr/Plt Sgt	Y	Data	NA	30 sec	15 sec	U	Enables Wpns Sqd Ldr to pass Range Card data to Plt Ldr. This allows him to create a sector sketch. This sketch allows the Co Cdr and Bn TOC the ability to integrate the crew served weapons in their fire support plan.
ART 1.2 ART 2.2 ART 2.5 ART 3.2 ART 5.3 ART 6.1 ART 6.2 ART 6.5 ART 7.2 ART 7.3 ART 7.4 ART 7.6	Orders Publication, Situation Change	Route / Way	Plt Ldr/ Plt Sgt	Co Cdr	N	Data	NA	15 min	8 min	U	Provides commanders enroute data to better synchronize fire and maneuver at time and place of choosing while reducing potential fratricides.
	Orders Publication, Situation Change	Route / Way	Co Cdr	Bn TOC	N	Data	NA	15 min	8 min	U	Provides the Bn TOC the ability to synchronize fire and maneuver at time and place of choosing while reducing potential fratricides.
	New or Updated Data	Field Medical Card	Soldier / Tm Ldr / Sqd Ldr	Plt Sgt	N	Data	NA	30 sec	15 sec	U	Provides timely medical information to Plt Sgt. This enables him to request appropriate medical equipment which protects the force. Allows the unit to maintain momentum.
	New or Updated Data	Field Medical Card	Plt Sgt	1SG/XO	N	Data	NA	30 sec	15 sec	U	Provides timely medical information to 1SG/XO. This enables him to request appropriate medical equipment and which protects and sustains the force. Allows the unit to maintain momentum.

Table 4-7. Non-Critical Intra-Army Information Exchange Requirements (continued)

Rationale: AUTL #	Event / Action	Information Characterization	Sending Node	Receiving Node	Critical	Format	Timeliness BLK I	Timeliness BLK II	Timeliness BLK III	Classification	Remarks
	New or Updated Data	Field Medical Card	Plt Sgt	1SG/XO	N	Data	NA	30 sec	15 sec	U	Provides timely medical information to 1SG/XO. This enables him to request appropriate medical equipment and which protects and sustains the force. This allows the unit to maintain momentum.
	New or Updated Data	Field Medical Card	1SG/XO	Med Plt Ldr/ Field Trains	N	Data	NA	30 sec	15 sec	U	Provides timely medical information to medical platoon leader and field trains. This enables them to request appropriate medical equipment and which protects and sustains the force. This allows the unit to maintain momentum.
	Execute Tactical Operations	Logistics Report	Plt Ldr/ Plt Sgt	1SG/XO	N	Data	NA	30 sec	8 sec	U	Provides timely logistical information to 1SG/XO. This enables them to request appropriate classes of supply to sustain the force. This allows the unit to maintain momentum.
	Execute Tactical Operations	Logistics Report	1SG/XO	Bn Trains	N	Data	NA	30 sec	8 sec	U	Provides timely logistical information to the Bn Trains. This enables them to request appropriate classes of supply to sustain the force. This allows the unit to maintain momentum.
	Situation Change	SITREP	Soldier	Tm Ldr, Plt Sgt, Plt Ldr	N	Data Voice	NA	30 sec	15 sec	U	Enables the ability to mass soldier, team, and sqd effects at the time and place of choosing. Keep chain of command informed of current situation.
	Situation Change	SITREP	Plt Ldr	Co Cdr	N	Data Voice	NA	30 sec	15 sec	U	Keep chain of command informed of current situation to enable ability to mass plt effects at time and place of choosing.
	Situation Change	SITREP	Co Cdr	Bn TOC	N	Data Voice	NA	30 sec	15 sec	U	Enables the ability to mass company effects at the time and place of choosing.
	NBC Event	NBC 1	Soldier	Tm Ldr, Plt Sgt, Plt Ldr	N	Data Voice	NA	6 sec	4 sec	U	Provides leaders with NBC information that allows them to protect themselves and their units accordingly.
	NBC Event	NBC 1	Plt Ldr/Plt Sgt	Co Cdr / 1SG/XO	N	Data Voice	NA	6 sec	4 sec	U	Provides company leadership with NBC information that allows them to protect themselves and their units accordingly.
	NBC Event	NBC 1	Co Cdr / 1SG/XO	Bn TOC	N	Data Voice	NA	6 sec	4 sec	U	Provides the Bn TOC with NBC information that allows them to protect themselves and their units accordingly. Proper protection will allow units to maintain momentum in offensive operations.
	NBC Event	NBC 4	Soldier	Tm Ldr, Plt Sgt, Plt Ldr	N	Data Voice	NA	6 sec	4 sec	U	Provides leaders with timely NBC information that allows them to protect themselves and their units accordingly.
	NBC Event	NBC 4	Plt Ldr/Plt Sgt	Co Cdr / 1SG/XO	N	Data Voice	NA	6 sec	4 sec	U	Provides company leadership with timely NBC information that allows them to protect themselves and their units accordingly.
	NBC Event	NBC 4	Co Cdr / 1SG/XO	Bn TOC	N	Data Voice	NA	6 sec	4 sec	U	Provides the Bn TOC with timely NBC information that allows them to protect themselves and their units accordingly. Proper protection will allow units to maintain momentum in offensive operations.
	Casualty Event	Call for Medic	Soldier – Bn	Medic	N	Data Voice	NA	6 sec	4 sec	U	Provides all soldiers and leaders with timely medical attention. This timeliness will save lives and allow soldiers to return to duty at a higher rate. This will maintain combat power and morale of the force.
	Casualty Event	MEDEVAC Report	Tm Ldr Sqd Ldr Plt Sgt Plt Ldr	1SG / XO / Co Medic /Med Plt Ldr	N	Data Voice	NA	6 sec	4 sec	U	Provides all soldiers and leaders with timely medical attention. This timeliness will save lives and allow soldiers to return to duty at a higher rate. This will maintain combat power and morale of the force.

RATIONALE: *This information exchange set represents the expected core capability that will enable an acceptable level of operational effectiveness, suitability and survivability.*

4.17 Logistics and Readiness: Soldier/Unit level PMCS will be performed daily in the field and weekly in garrison. The soldier's responsibility for PMCS will consist of the following: Before Operation checks; During Operations checks that will be limited to monitoring integrated systems when in operation; After Operations checks; and Weekly checks. Unit level maintenance personnel will accomplish scheduled services.

RATIONALE: *Common sense checks to insure LW ensemble is combat ready.*

4.18 Environmental, Safety, and Occupational Health (ESOH) and Other System Characteristics:

4.18.1 The system shall comply with all applicable safety and health requirements so as not to present uncontrolled safety and health hazards to the system soldiers or maintenance personnel throughout its life cycle.

RATIONALE: *The LW system must comply with all applicable safety and health requirements so as not to present uncontrolled safety and health hazards to the soldier throughout its life cycle. The system must meet mission profile objectives where possible; however, commercial components will be incorporated to reduce cost.*

4.18.2 Electromagnetic Environmental Effects (E3) and Spectrum Supportability. LW will comply with spectrum supportability within the United States and with all host nations where the system will deploy. Spectrum supportability shall be determined for the life of the system through the Military Communications Electronics Board (MCEB).

RATIONALE: *Ensures environmental effects (emission) signature, interference, and vulnerability to E3 effects of LW units.*

5.0 Program Support.

5.1 Maintenance Planning:

5.1.1 Logistical and maintenance support will be based on data derived from the Logistics Support Analysis (LSA) process. Interim contractor maintenance support is anticipated for a period not to exceed three years. Field level maintenance includes PMCS, the conduct of BIT checks, fault identification, and the replacement of inoperative components and line replaceable units (LRU's). Sustainment maintenance will repair components, LRU's, and Shop Replaceable Units (SRU's) and return them to the supply system.

5.1.2 The foundation of support to a force within the Army's Objective Force is anticipatory logistics, dependent on battlefield distribution and throughput, and enabling technologies. Anticipatory logistics leverages situational awareness and total asset visibility to provide warfighting commanders timely and accurate support. Battlefield distribution capitalizes on enabling technologies to increase velocity in the distribution pipeline. Total asset visibility ensures that combat service support assets get the correct location on time. Increased dependence on throughput requires that line of communication remain open and secure.

5.1.3 The LSA process will assign appropriate codes to the LRU's and Shop Replaceable Units (SRU's) commensurate with security and sensitivity requirements. Only specific components will be designated as a weapon. Unit Supply evacuates the inoperative components and LRU's to its field level forward support contact team. The unit supply will also provide batteries, and other expendables, as required for LW operation. The field maintenance element will repair or replace the inoperative components or LRU within its capability or evacuate components through the distribution system to a maintenance activity that has the capability and capacity to perform the repair. The LSA process will determine specific procedures.

5.1.4 Depot level maintenance of electronic components will be conducted for a minimum of two years after Initial Operational Capability (IOC) under the Interim Contractor Support (ICS) concept. LW shall be designed to facilitate soldier and maintainer ability to maintain LW fully operational within the Army Maintenance System, using standard tools and Test, Measurement, Diagnostic Equipment (TMDE) at the time of fielding. LW shall be fully compatible with logistics automation systems.

5.2 Support Equipment:

5.2.1 Any TMDE required should be located at the sustainment level of support, and provide a cost effective means of unambiguous fault isolation (BITE/BIT) to the failed LRU level with at least 95% accuracy.

5.2.2 Electro-optic LRU's will be evaluated for fault isolation, if required to a SRU by use of Integrated Family of Test Equipment (IFTE).

5.2.3 Batteries: Rechargeable batteries should have a simple indicator, preferably built-in, which verifies state of charge. There is no requirement for on-battery charge indication for non-rechargeable batteries. Battery charging equipment, operated by the battalion task force, will be designed to minimize manpower, charge time, transportation, float assets, and tactical electrical power. Battery charging equipment must be deployable with units to remote training locations with capability to be integrated as needed into the unit standard logistic resupply concept. It must be operationally tested with LW systems and with proposed battery technologies. Other equipment needed to store, stack, transport and distribute batteries will be optimized for company level operations.

5.2.4 Special Tools: LW maintenance will minimize special tools to the supporting unit organization. If required, a cost benefit analysis will be performed prior to materiel fielding to justify the recommended course of action (Threshold). LW will not require special tools for maintenance through the field maintenance level (Objective).

5.2.5 Test Measurement and Diagnostic Equipment (TMDE): BITE/BIT will isolate and report failures or faults occurring in the system to the maximum extent possible. The extent of off-line BIT to isolate faults of an LRU will be determined by the LSA process.

5.3 C4I/Standardization, Interoperability, and Commonality. The LW System will be Joint Technical Architecture-Army (JTA-A) compliant where applicable, and have the ability to interface with joint, and allied forces. Based on the mission needs of the small unit, the combat developer may approve message types that are not initially compliant with the JTA-A. In such cases, a migration plan to JTA-A compliance will be established. Panel III NATO has approved the NATO Soldier Modernization Plan (NSMP), which includes a requirement for the LW. Specific requirements, not delineated here, are found in appropriate sections of this ORD.

5.4 Computer Resources:

5.4.1 The host hardware and software utilized to develop the LW software shall consist of commercially available hardware and software components.

5.4.2 Technical Manual (s) will be Interactive Electronic Technical Manual(s) (IETM) for –20 and above level of maintenance.

5.5 Human Systems Integration:

5.5.1 The LW system will be designed with MANPRINT as an integral part of the materiel acquisition process.

5.5.2 Human Systems Integration will be given equal consideration with technical and programmatic decisions during LW system trade-off analyses. LW's successful integration of modern technology with soldiers' inherent skills and knowledge will revolutionize military operations. The soldier is considered the system and his mission success and survivability will depend upon the effective use of subsystem components. No system ever fielded has affected soldiers at such a personal level as LW. Soldiers will wear, carry, and use the LW System on a continuing basis. Therefore, the importance of human-system integration to this program is imperative. The combat developer, target audience soldiers, and practitioners from each MANPRINT domain must be involved with the materiel developer in the design process beginning with concept exploration and continuing for the program duration. Subsystems must be thoroughly compatible with each other and with soldier's physical and cognitive capabilities. MANPRINT for this program should receive management emphasis and be a primary topic of discussion at every program meeting. MANPRINT working group

meetings will be convened to assist the materiel user and materiel developer to identify and solve human system integration issues. The following are minimum MANPRINT requirements for LW:

5.5.2.1 Manpower: The LW system may necessitate an increase in total force structure to accommodate increased operational capabilities. However, appropriate analysis will be conducted to identify force structure impacts. The results of these analyses will be incorporated into a Manpower, Personnel and Training Assessment to be submitted at each Milestone Decision Review as part of the MANPRINT Integration Review. Task analysis and individual and collective task development will be performed using the Automated Systems Approach to Training database software provided as Government Furnished Equipment.

5.5.2.2 Personnel: The introduction of LW into the force structure may incur qualitative or quantitative changes in personnel requirements. New Military Occupational Specialties (MOS) or modifications to existing MOS skill sets may be required for operators or maintainers. Appropriate studies and analysis will be completed to identify and assess personnel impacts. The results of these efforts will be incorporated into a Manpower, Personnel and Training Assessment to be submitted at each Milestone Decision Review as part of the MANPRINT Integration Review.

5.6 Training:

5.6.1 Overview: The LW training strategy is outlined in the System Training Plan, which describes the total training plan for integrating the LW into the training base and gaining units. This document includes plans for all necessary training support, training products, and courses; and sets milestones to ensure the accomplishment of the training strategy. Development of the training strategy and the LW Training Support Package (TSP) for the Training and Doctrine Command (TRADOC) will be accomplished through contract efforts under the oversight, direction, and time-phased approvals of the Infantry School's Directorate of Operations and Training (DOT) and the TRADOC System Manager (TSM)-Soldier. The LW design must integrate human engineering design concepts to minimize the amount of training necessary. Training should be oriented towards the LW target audience and should provide efficient and effective training for the soldier on the modular system capabilities. Prior to fielding, a training assessment will be conducted and complete training requirements will be defined.

5.6.1.1 Employing the systems approach to training, with input from the training and combat developers, a contract effort will update the System Training Plan (STRAP), for submission to TRADOC, DCST for approval. The STRAP identifies and addresses the following: comprehensive LW training missions; training functions; training responsibilities; training-specific doctrinal literature; training aids, devices, simulators, and simulations (TADSS); training ranges and Targetry; institutional training; and unit sustainment training.

5.6.1.2 The detailed training plan and strategy will include training cost-estimates for training resources, the instructional design models in training devices, the impact of embedded training features, other instructional features on system design, other TADSS, and in process reviews to assess and update the plan, and milestones for completion. The cost-trade-offs will be submitted to DOT and TSM-Soldier for review and approval. DOT and TSM-Soldier will establish specifications for training devices and embedded training/instructional features.

5.6.1.3 Operator and maintainer new equipment training (NET) will be conducted by contract; under the oversight of the Infantry School DOT, respective service school DOT's as appropriate, as well as other government subject matter experts. The development of doctrine and tactics, techniques, and procedures (TTP's) for test and evaluation and NET will be a contract effort under the oversight of the Infantry School Combined Arms and Tactics Directorate (CATD) and TSM-Soldier.

5.6.1.4 Institutional training plans and POI's will be developed under contract, and reviewed and approved by the Infantry School DOT, or the appropriate service school. The appropriate service school using the approved POI's will then conduct institutional training. Appropriate sustainment training for operators and maintainers will be developed subsequent to NET. The units themselves will execute sustainment training using the training materials provided to them during NET.

5.6.1.5 Evaluation of training effectiveness will be jointly undertaken by the combat and material developers, with oversight by the Infantry School's DOT and the TSM Soldier. Evaluation of the effectiveness and suitability of doctrine and TTP's will be conducted by the Infantry School CATD and TSM-Soldier during Operational Testing.

5.6.2 Training Concept and Assumptions: As the LW system impacts most of the soldier's and leader's see, shoot, and communicate tasks as well as how collective tasks are planned and executed, the scope of LW training is broad, impacting large segments of current institutional and unit training. There must be a solid institutional base for training LW soldiers and leaders. LW skills will not be and cannot be acquired through on-the-job training. To establish this training base, institutional courses (One Station Unit Training [OSUT], leader courses, Infantry pre-command course) must be lengthened. Increases in course length will vary with the course, the exit skills required, and extent of LW fielding. The LW training support package must be comprehensive, integrate individual LW marksmanship skills (multiple sights - day - night skills), integrate leader skill training, and insure a systematic progression of computer skills, tactical employment, and collective training.

5.6.3 Embedded Training and Other Instructional Features of the LW System: The LW system will incorporate embedded training technology, taking advantage of the system's computer capability to train in a wide spectrum of situations with the LW tactical system. The embedded training and instructional objectives are to attain and sustain the soldier and leader's abilities to operate the LW system, to maintain it, and to

use it in combat engagement simulations and field settings. Performance feedback will be an integral part of the ET capability.

5.6.4 System Hardware Requirements: The LW system must be designed to embed computer-based and interactive training, to provide a network to link tactical systems for training exercises such as tactical exercise without troops (TEWT's). The LW system must also embed or allow for mechanical or electrical interface with any appended training devices in accordance with requirements listed as training requirements. The training base or institution requires system hardware in order to train all skill levels. The primary system hardware preferred is the actual LW system with its embedded training.

5.6.5 Training Publications: The training materials will be an integral part of the LW Training Test Support Package (TTSP) and will be evaluated as part of the system training effectiveness analysis conducted during the system evaluation. Training materials will be developed for review and approval by the appropriate institution for the operator's manual, maintenance manuals for the system for unit through direct support (DS) level, training management manuals, and course material for the courses taught in the institution and during NET.

5.6.6 NET: The NET POI for the LW will be developed, and approved by the USAIS training and doctrine developers. This will include the necessary zero, practice and record firing with appropriate weapon and sight combinations to qualify the soldiers on their assigned individual and crew-served weapons (except pistols). LW fielding plan will include a training package that resources all leader training, ammunition, range, logistical, technical resources for the (NET) unit. Trainers will be provided to teach all aspects and echelons of the system to unit leaders (train the trainer). LW will develop an extensive leader-training package that echelon the necessary tasks based on the level of responsibility and level of potential employment of leaders trained. Included in the training plan is battery power saving techniques, and detailed analysis information educating leaders of the impact (power consumption) of each additional module. LW will resource comprehensive marksmanship training in all spectrums and environments. Training will occur with associated weapon system zeroing, boresighting, borelighting and calibration. Movement familiarization training conducted in all conditions and terrain. The NET should involve lane training at the squad and platoon level. Information exercises where leaders execute go to war tasks and become familiar with transmitting information to executing units will be included as well as soldier/leader training on information management. Logistical training will teach leaders how LW will be sustained in the field and garrison. Leader training will include LW and its integration into all battlefield operating systems. Physical training program that increases necessary dexterity and agility skills necessary with each module or value added to LW. Echelon technical training focused at leader and operator roles. System trouble shooting. Collective training force on force and live fire exercises to validate unit readiness. The material developer (MD) will be responsible for funding and providing the approved range changes and ammunition necessary to qualify the LW soldiers with the varied weapon and sight combinations available at the installation where the training is to be

conducted. A comprehensive combat marksmanship program will be executed as part of NET. The NET POI will be included in the TTSP and be validated during train-up for the technical/operational evaluation window. The new equipment training team (NETT) will provide training on the LW System for operators, unit level maintainers, and DS maintainers. Unit personnel will receive training necessary to become proficient in the skills and tasks required to accomplish the unit's mission with the LW System. The NETT will train the unit in operation and employment of the system, operator and unit maintenance, organization, operations, and doctrine and tactics. During NET, key personnel will also receive instruction and training to prepare them to execute, integrate, sequence, and apply the LW training resources in an effective and efficient manner to sustain a trained status within the unit. A complete Training Support Package (TSP) with all necessary training materials (POI, lesson plans, slides, handouts, practical exercises, examinations, CD-ROM, operator videotapes, etc.) will be left with the unit to use as a basis for sustainment training.

5.6.7 Ranges and Targetry. The capabilities of the LW System and its future technical insertions may require modifications and additions to current ranges, training centers, and targetry in order to train all the capabilities to the standard for combat. The need for any changes will be considered during the evaluation period. Proposed range and targetry changes will be developed as part of a comprehensive combat marksmanship program for the LW System to be included in the TTSP and evaluated during system testing. Once validated in testing and approved by DOT, approved changes will be implemented at the receiving unit home station or NET training site prior to NET.

5.6.8 Training Ammunition: Changes to the Standards in Weapons Training will be considered during the evaluation period.

5.6.9 Maintenance: Training for any special equipment and procedures will be integrated into the TTSP, evaluated during the system evaluation, and included in NET. Institutional maintenance training POI's will be provided by contract and sustained through courses taught to maintainers at TRADOC schools.

5.6.10 Training Device Requirements: Training device requirements will be evaluated during the LW system evaluation. The requirement for training devices may not be fully known until the initial training effectiveness analysis has been completed during system evaluation.

5.6.11 Other Instructional Materials: Instructional Materials will be provided for both NET and unit sustainment training.

5.6.12 Training Effectiveness Analysis: An initial training effectiveness analysis (TEA) will be conducted during training in support of the technical/operational test window. Results of the initial analysis will validate the Training Strategy and STRAP in preparation for fielding. Subsequent TEA(s) will occur during initial fielding of the LW system. The TEA will validate changes to NET based on analysis of LW fielding feedback, to validate the effectiveness of the institutional training package,

and/or to validate the effectiveness of training support and devices not available for assessment in prior TEA's. These training evaluations support the required MANPRINT assessments and will help ensure effective training in the institution and field.

5.7 Human Engineering: Weight, balance, comfort, and user interface will be optimized for clothing, hardware, electronic, and computer subsystems. All subsystems, components and sub-components of the LW shall be designed to maximize the soldier/equipment interface. The LW shall be designed as a system making use of function allocation techniques, based on the dynamic soldier's capabilities and tasks, for effective distribution of system capabilities between the soldier and the equipment. A Human Factors Engineering Assessment will be conducted at every Milestone Decision Review and will provide input to the MANPRINT Integration Review (MIR).

5.7.1 The system shall be designed for operation and maintenance by the 5^{th} to 95^{th} percentile male soldiers while wearing every configuration of the LW uniform and equipment (to include MOPP IV and environmental clothing protection levels) under all conditions specified in the operational mode summary/mission profile.

5.7.2 System components must be fully integrated and compatible with each other and the soldier.

5.7.3 Sound Human Engineering principles will be used in system design to ensure that target audience infantry soldiers are capable of performing required tasks (avoid task and cognitive overload) with 95 percent reliability and accuracy.

5.8 System Safety: All safety hazards will be eliminated or reduced to an acceptable level of risk as outlined in appropriate regulations and MIL Standards. A system safety assessment will be completed as part of the design process to ensure the system is free from conditions, which can cause death, injury, or illness to target audience soldiers. The system safety assessment will be updated prior to each milestone decision review and results will be incorporated into the MANPRINT Integration Review to be submitted prior to each Milestone Decision Review (MDR).

5.9 Health Hazards: The system shall be designed to eliminate or control all potential health hazards including electrical shock, noise, heat, cold, and toxicity. A health hazard assessment will be completed as early as practical in the program to identify potential health hazards. Results of the health hazard assessment will be incorporated into the MANPRINT Integration Review to be submitted prior to each MDR. The health hazard assessment will be updated and presented at each Milestone Decision Review.

5.10 Soldier Survivability: The Survivability/Lethality Analysis Directorate will conduct A Soldier Survivability Assessment (SSVA) after the Milestone I/II review. Results will be incorporated into the MANPRINT Assessment to be submitted prior to each Milestone Decision Review. The system will be designed so that Electronic Warfare, Ballistic, Nuclear, Chemical, and Biological weapons and countermeasures cannot defeat it easily. The SSVA will be updated and presented at each MDR.

5.11 Other Logistics and Facilities Considerations: The proliferation of small arms, night vision equipment, and communications equipment fielded to the force over the past several years has resulted in severe crowding of unit storage facilities. As the Army continues to field a considerable array of new equipment items over the next decade, the problem will worsen. Further, the storage facilities predominantly employ manual accounting procedures that make issuance, maintenance, and accountability of equipment a cumbersome problem. These facilities are not deployable with the unit. The Army Corps of Engineers has assumed responsibility to construct facilities to fit the needs and the mission of the 21st century soldier.

5.12 Transportation and Basing:

5.12.1 The LW system will use the existing and projected transportation assets that will be available to transport soldiers at the time of fielding.

5.12.2 LW will not increase the requirement for cargo or personnel space on current Military Airlift Command Aircraft, Army and Air Force Aviation Aircraft, and normal military, ground transportation modes.

5.12.3 LW will not require any special training facilities however, additional operational facilities for storage to include new construction, though complete requirements are not as of yet identified, will be required for LW sensitive and high dollar equipment items. The Corps of Engineers is constructing barracks that will allow for the storage of LW systems (the fireman locker concept) in the immediate area where soldiers will receive classroom training.

5.13 Geospatial Information and Services: The system will require standard National Imagery and Mapping Agency (NIMA) digital topographic data. A fully integrated worldwide position navigation capability is required (i.e., United States Air Force (USAF) GPS).

5.14 Natural Environmental Support: LW has no unique weather, oceanographic or astro-geophysical support requirements. Specific LW System environmental requirements are included in appropriate paragraphs within this requirements document.

6. Force Structure.

6.1 The total number of LW systems required will consist of the sum of selected TOE unit requirements, selected TDA organizations and Schools, and maintenance spares. LW will be integrated into schools for familiarization training in professional development courses, operator and maintainer training courses, and one station unit training (OSUT) – Infantry.

6.1.1 The Block I fielding objective is to provide LW systems to 75th Ranger Regiment. Based on the organizational and operational profile of the regiment, 100

percent issue to soldiers at company and below is envisioned as well as to key individuals within the battalion and regimental command and control structure. The Ranger Regiment will require 1,875 LW systems.

6.1.2 The Block II requirement is to field LW systems within the Army IBCT force structure. Approximately 1,425 systems per IBCT. Current Army force structure guidance is to field six IBCT's, totaling 8,550 systems.

6.1.3 The remainder of the Army force structure commitment falls within Block III. Prior to Milestone III, the exact quantities will be determined based on the results of basis of issue field analysis and the Army Transformation Campaign Plan.

6.2 Priority of issue is to Ranger Battalions of the Ranger Regiment followed by IBCT's. Accelerated fieldings would be directed towards Infantry Airborne, Air Assault, Light, Mechanized and those soldiers in direct support of maneuver battalions.

6.3 The Basis of Issue Plan Feeder Data (BOIPFD) is being developed for approval. The BOIPFD lists the distribution of the LW Systems, to include support soldiers.

6.4 Milestone III fielding requirements will be based upon Army Transformation Campaign Plan, Analysis of Alternatives (AoA) results LW BOIP analysis, and IOT & E results. Block I and II procurements would be for the approximate quantities specified in paragraph 6.1. To facilitate economic order quantities and enable continuous fielding, a portion of block II requirements can be procured based on successful completion of Block I, with actual fielding dependent on achieving capability requirements for the force design.

7. Schedule.

7.1 First Unit Equipped (FUE). FUE is defined as the completion of issue of the LW systems and NET to a Battalion size organization. FUE is required: FY04.

7.2 IOC. IOC is defined as the completion of issue of the LW system, NET, TADSS are available, and the maintenance and support structure is in place to support a brigade/regiment (i.e., Ranger Regiment). IOC is required: FY05.

7.3 Full Operational Capability (FOC). FOC is defined as the completion of issue of the LW system, NET, TADSS are available, and the maintenance and support structure is in place to support a Corps size element. This includes full integration of LW into the ABCS, with the accompanying Light Digital TOC, on a comparable level as the Army's Heavy Forces.

8. Program Affordability: The cost for the LW System is a key factor in determining the Army's ability to provide this critically needed system for the Infantryman.

	Threshold	Objective
Then Year $M		
TOTAL RDT&E	$972.0M	$680.9M
TOTAL PROCUREMENT	$4,938.4M	$3,754.2M
TOTAL MILITARY PERSONNEL	$55.0M	$55.1M
TOTAL MILCON	$0.0M	$0.0M
TOTAL O&S	$9,652.2M	$13,113.9M
Base Year $M (FY2001)		
TOTAL RDT&E	$731.0M	$493.0M
TOTAL PROCUREMENT	$3,265.4M	$2,585.4M
Flyaway	$3,013.6M	$2,345.0M
Spares	$80.8M	$69.5M
Other	$171.0M	$170.9M
Peculiar	$0.0M	$0.0M
TOTAL MILCON	$0.0M	$0.0M
MP DIRECT FUNDED ELEMENTS	$21.8M	$21.8M
TOTAL O&S	$5,765.7M	$7,949.7M
Total Procurement Quantities	47,245	47,245
Average Procurement Unit Cost BY2001$	$31,785	$32,862

Table 8-1. Life Cycle Cost Requirements

Table Notes:

Assumption: The Threshold cost of the system includes the cost to upgrade system capability based on required enhancements identified in the ORD.

RDT&E is higher in the Threshold column due to required development costs to meet stated requirements.

Procurement is higher in the Threshold column due to higher production unit costs to meet stated requirements.

MP funding remains relatively the same to support program office staffing needs.

O&S funding is higher in the Objective column due to lower battery power density and lower reliability of system

Appendix A

References

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Appendix B

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PM, PEO, TACTICAL MISSILES, ATTN: SFAE-MSL-AB, REDSTONE ARSENAL, AL 35898-5650

PM, PEO, TACTICAL MISSILES, ATTN: SFA-E-MSL-CC, REDSTONE ARSENAL, AL 35898-5710

PM, PEO, TACTICAL MISSILES, ATTN: SFAE-MSL-AM, REDSTONE ARSENAL, AL 35898-5720

PM, PEO, TACTICAL MISSILES, ATTN: SFAE-MSL-ML, REDSTONE ARSENAL, AL 35898-5700

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PM, TACTICAL UNMANNED AERIAL VEHICLE (TUAV), ATTN: PEO-CU-UAV-TU, REDSTONE ARSENAL, AL 35898-5701

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PM U.S. ARMY AVIATION & MISSILE COMMAND, ATTN: AMSAM-DSA-TM, REDSTONE ARSENAL, AL 35898-5400

PM, U.S. ARMY AVIATION & MISSILE COMMAND, ATTN: AMSAM-DSA-UH, BUILDING 5308, REDSTONE ARSENAL, AL 35898

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PM, NIGHT VISION/RSTA, ATTN: SFAE-IEW-NV, FORT BELVOIR, VA 22060-5806

PM, GROUND WEAPONS, MARCORSYSCOM (CODE CBG), BLDG 2032, QUANTICO, VA 22134-5080

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PM, ACIS, ATTN: SGAE-AV-LSE, BLDG 5681, REDSTONE ARSENAL, AL 35898

PM, LAND WARRIOR, ATTN: AMSSB-PM-RST-L(B), 10401 TOTTEN ROAD, SUITE 121, FORT BELVOIR, VA 22060

PM, ENHANCED SOLDIER SYSTEM, ATTN: AMSSB-PM-RST-E(B), 10401 TOTTEN ROAD, SUITE 121, FORT BELVOIR, VA 22060

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TPIO-ABCS, U.S. ARMY COMBINED ARMS COMMAND, ATTN: ATZL-TP, FT LEAVENWORTH, KS 66027-2300

TPIO-SYNTHETIC ENVIRONMENT, NATIONAL SIMULATION CENTER, ATTN: ATZL-NSC-TP, FT LEAVENWORTH, KS 66027-1306

TPIO-TD, U.S. ARMY ENGINEER SCHOOL, ATTN: ATSE-TPIO, FT LEONARD WOOD, MO 65473-8929

TPIO-DISTANCE LEARNING, U.S. ARMY TRAINING AND DOCTRINE COMMAND, ATTN: ATTG-C, FT MONROE, VA 23651-5000

TSM-ABRAMS, U.S. ARMY ARMOR CENTER, ATTN: ATZK-TS, FT KNOX, KY 40121-5000

TSM-AFATDS, U.S. ARMY FIELD ARTILLERY SCHOOL, ATTN: ATSF-FSC-3, FT SILL, OK 73503-5600

TSM-ASAS, U.S. ARMY INTELLIGENCE CENTER AND FT HUACHUCA, ATTN: ATZS-AS, FT HUACHUCA, AZ 85613-6000

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TSM-COMANCHE, U.S. ARMY AVIATION CENTER AND FT RUCKER, ATTN: ATZQ-TSM-C, FT RUCKER, AL 36362-5010

TSM-CSSCS, U.S. ARMY LOGISTICS CENTER, 2521 A. AVENUE, ATTN: ATCL-K, FT LEE, VA 23801-1701

TSM-CATT, U.S. ARMY COMBINED ARMS COMMAND, ATTN: ATZL-NSC-C, FT LEAVENWORTH, KS 66027-1306

TSM-ECS, U.S. ARMY ENGINEER SCHOOL, 320 ENGINEER LOOP, SUITE 160, FT LEONARD WOOD, MO 65473-8929

TSM-FORCE XXI, U.S. ARMY ARMOR CENTER, ATTN: ATZK-XXI, FT KNOX, KY 40121-5000

TSM-GBCS, U.S. ARMY INTELLIGENCE CENTER & FT HUACHUCA, ATTN: ATZS-GB, FT HUACHUCA, AZ 85613-6000

TSM-JOINT STARS/JTT, U.S. ARMY INTELLIGENCE CENTER AND FT HUACHUCA, ATTN: ATZS-JS, FT HUACHUCA, 85613-6000

TSM-LONGBOW, U.S. ARMY AVIATION CENTER. ATTN: ATZQ-TSM-LB, FT RUCKER, AL 36362-5012

TSM-MCS/GCCSA, U.S. ARMY COMBINED ARMS COMMAND, ATTN: ATZL-TSM, FT LEAVENWORTH, KS 66027-2300

TSM-NM, U.S. ARMY SIGNAL CENTER & FT GORDON, ATTN: ATZH-NM, FT GORDON, GA 30905

TSM-SATCOM, U.S. ARMY SIGNAL CENTER & FT GORDON, ATTN: ATZH-TS, FT GORDON, GA 30905

TSM-BC, US ARMY SIGNAL CENTER & FT GORDON, ATTN: ATZH-FC, FT GORDON, GA 30905

TSM-TR, US ARMY SIGNAL CENTER & FT GORDON, ATTN: ATZH-TR, FT GORDON, GA 30905

TSM-SHORAD, U.S. ARMY AIR DEFENSE ARTILLERY SCHOOL, ATTN: ATSA-TSM-SH, FT BLISS, TX 79916-3802

TSM-TWV, U.S. ARMY TRANSPORTATION CENTER, ATTN: ATZF-TW, FTEUSTIS, VA 23604-5457

TSM-TMD, U.S. ARMY AIR DEFENSE ARTILLERY SCHOOL, ATTN: ATSA-TSM-TMD, FT BLISS, TX 79916-3802

TSM-UAV, U.S. ARMY INTELLIGENCE CENTER & FT HUACHUCA, ATTN: ATZS-UA, FT HUACHUCA, AZ 85613-6000

CF:

HEADQUARTERS, US AIR FORCE, ATTN: XORD, 1480 AIR FORCE PENTAGON, WASHINGTON, DC 20330-1480

HEADQUARTERS, AIR COMBAT COMMAND. ATTN: DRPM, 205 DODD BOULEVARD, LANGLEY AIR FORCE BASE, VA 23665-2788

COMMANDING GENERAL, US MARINE CORPS COMBAT DEVELOPMENTS COMMAND, ATTN: C441, QUANTICO, VA 22134-5010

COMMANDING GENERAL, US MARINE CORPS SYSTEMS COMMAND, ATTN: CODR 21003 BARNETT AVENUE, SUITE 315, QUANTICO, VA 22134-5010

CHIEF OF NAVAL OPERATIONS, ATTN: N81, 2000 NAVY PENTAGON, WASHINGTON, DC 20350-2000

COMMANDER, US ARMY MEDICAL RESEARCH & MATERIEL COMMAND, ATTN: MCMR-ZA, FORT DETRICK, MD 21702-5012

COMMANDER, US ARMY CENTER FOR HEALTH PREVENTION & PREVENTIVE MEDICINE, ATTN: MCHB-DS-I-IA, ABERDEEN PROVING GROUND, MD 21010

Glossary

Part 1 - Acronyms and Abbreviations

ABCS	Army Battle Command System
ASIP	Advanced SINCGARS Improvement Program
ATM	Army Tactical Mission
BFV	Bradley Fighting Vehicle
BIT	Built In Test
BLPS	Ballistic/Laser Eye Protective System
CCO	Close Combat Optic
CFE	Contractor Furnished Equipment
CFF	Call For Fire
CID	Combat Identification
CLU	Javelin - Command Launch Unit
CNR	Combat Net Radio
COMSEC	Communications Security
DVS	Daylight Video Sight
FBCB2	Force XXII Battle Command Brigade-and-Below
FO/FIST	Forward Observer/Fire Support Team
FRAGO	Fragmentation Order (Change due to conditions in OP Order)
GPS	Global Positioning System
I2	Image Intensifier
ICIDS	Individual Combat Identification for the Dismounted Soldier
IBCT	Interim Brigade Combat Team
IFTE	Integrated Family of Test Equipment
JCAD	Joint Chemical Agent Detector
JSLIST	Joint Services Lightweight Integrated Suit Technology
JTA-A	Joint Technical Architecture-Army
JVMF	Joint Variable Message Format
LBV	Load Bearing Vest
LDR	Leader
LW	LW
MANPRINT	Manpower and Personnel Integration
MILES	Multiple Integrated Laser Engagement System
MIL-STD	Military Standard
MG	Machine Gun
MOLLE	Modular Lightweight Load-Carrying Equipment
MOPP	Mission Oriented Protective Posture(for CB Protective Gear)
MWS	Modular Weapon System
NBC	Nuclear, Biological, Chemical
NET	New Equipment Training
NIMA	National Imagery and Mapping Agency
OPTEMPO	Operational Tempo
ORD	Operational Requirements Document
P3I	Pre-planned Product Improvement

PLGR	Precision Lightweight GPS Receiver
R	Receive
RTO	Radio-Telephone Operator
SA	Situation Awareness
SAW	Squad Assault Weapon
SBU	Sensitive But Unclassified
SINCGARS	Single Channel Ground Air Radio System
T	Transmit
TEISS-D	The Enhanced Integrated Soldier System – Dismounted
TES	Tactical Engagement Simulation
TI	Tactical Internet
TAC	Tactical Operations Center
TOW	Tube-launched, Optically-tracked, Wire-guided Missile
ITAS	Improved Target Acquisition System
TR	Transmit/Receive
TWS	Thermal Weapons Sight
U.S.	United States

Part 2 - Terms and Definitions

Acquisition Category (ACAT): Categories established to facilitate decentralized decision-making and execution and compliance with statutorily imposed requirements. The categories determine the level of review, decision authority, and applicable procedures. The DOD 5000.2-R, part 1, provides the specific definition for each acquisition category (ACAT I through III).

Capstone Requirements Document (CRD): A document that contains capabilities-based requirements that facilitates the development of individual operational requirements documents by providing a common framework and operational concept to guide their development. It is an oversight tool for overarching requirements for a system-of-systems or family-of-systems.

Information Exchange Requirements: The requirement for information to be passed between and among forces, organizations or administrative structures concerning ongoing activities. Information exchange requirements identify who exchanges what information with whom, as well as why the information is necessary and how that information will be used. The quality (i.e., frequency, timeliness, security) and quantity (i.e., volume, speed, and type of information such as data, voice, and video) are attributes of the information exchange included in the information exchange requirement.

Interoperability: (1) The ability of systems, units, or forces to provide services to and accept services from other systems, units, or forces and to make use the services, units, or forces and to use the services so exchanged to enable them to operate effectively together. (2) The condition achieved among communications-electronics systems or items of communications-electronics equipment when information or services can be exchanged directly and satisfactorily between them and/or their users. The degree of interoperability should be defined when referring to specific cases.

Key Performance Parameters (KPPs): Those capabilities or characteristics considered most essential for successful mission accomplishment. Failure to meet an ORD KPP threshold can be cause for the concept or system selection to be reevaluated or the program to be reassessed or terminated. Failure to meet a CRD KPP threshold can be cause for the family-of-systems or system-of-systems concept to be reassessed or the contributions of the individual systems to be reassessed. The KPPs are validated by the JROC. The ORD KPPs are included in the APB.

Milestones: Major decision points that separate the phases of an acquisition program.

Mission Need Statement (MNS): A formatted non-system-specific statement containing operational capability needs and written in broad operational terms. It describes required operational capabilities and constraints to be studied during the Concept Exploration and Definition Phase.

Objective: An operationally significant increment above the threshold. An objective value may be the same as the threshold when an operationally significant increment above the threshold is not significant or useful.

Operational Requirements: A system capability or characteristic required to accomplish approved mission needs. Operational (including supportability) requirements are typically performance parameters, but they may also be derived from cost and schedule. For each parameter, an objective and threshold value must also be established.

Operational Requirements Document (ORD): A formatted statement, containing performance and related operational parameters for the proposed concept or system. Prepared by the user or user's representative at each milestone beginning with Milestone I.

Requirement: The need of an operational user, initially expressed in broad operational capability terms in the format of a MNS. It progressively evolves to system-specific performance requirements in the ORD.

System Capabilities: Measures of performance such as range, lethality, maneuverability, and survivability.

System Characteristics: Design features such as weight, fuel capacity, and size. Characteristics are usually traceable to capabilities (e.g., hardening characteristics are derived from a survival capability) and are frequently dictated by operational constraints (e.g., carrier compatibility) and/or the intended operational environment (e.g., NBC).

Threshold: A minimum acceptable operational value below which the utility of the system becomes questionable.